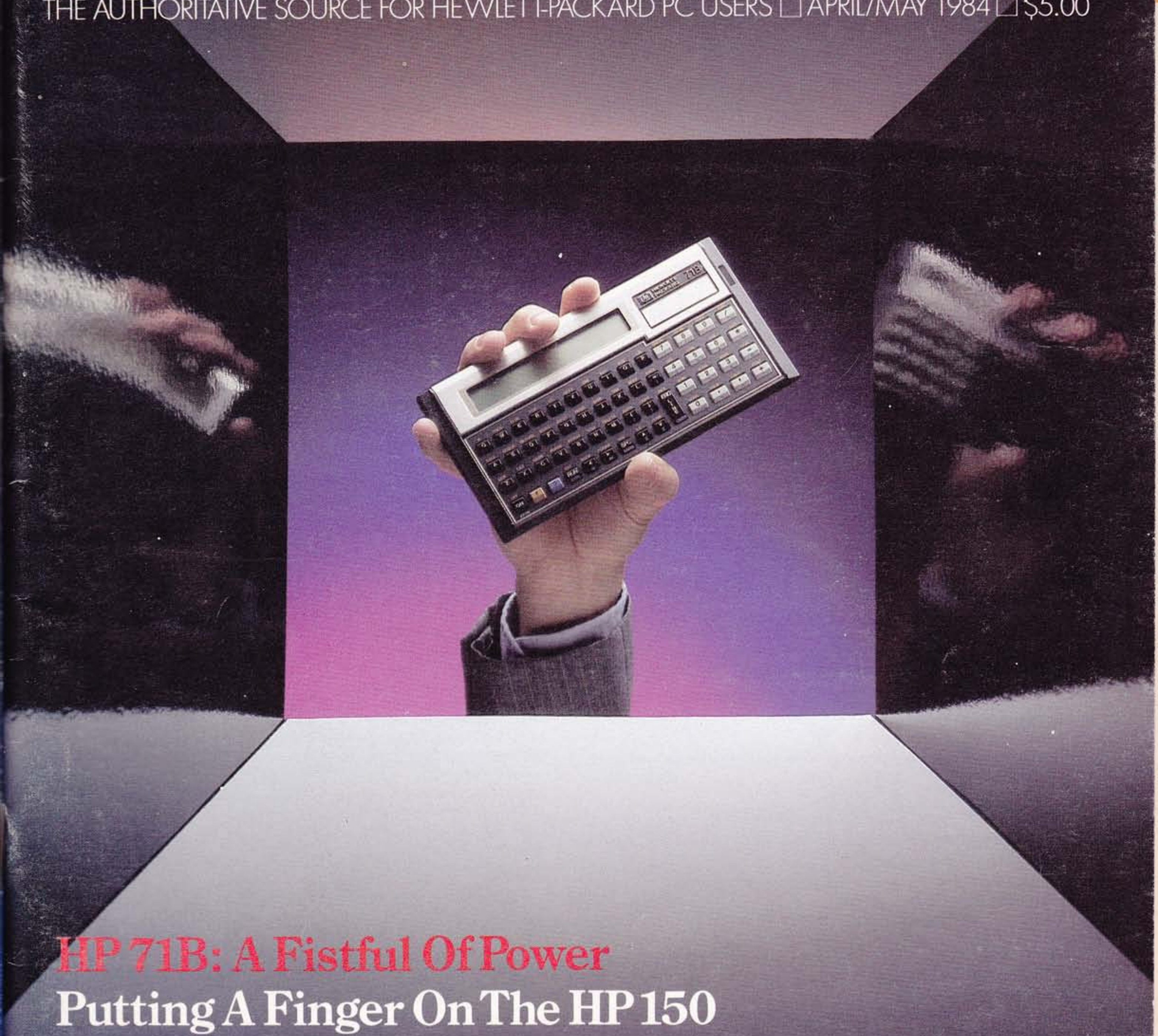
PREMIER ISSUE
A JOHN WILEY & SONS PUBLICATION

PROFESSIONAL COMPUTING

THE AUTHORITATIVE SOURCE FOR HEWLETT-PACKARD PC USERS ☐ APRIL/MAY 1984 ☐ $5.00



HP 71B: A Fistful Of Power

Putting A Finger On The HP 150

Series 80 Talks Back

Identifying Data Highwaymen

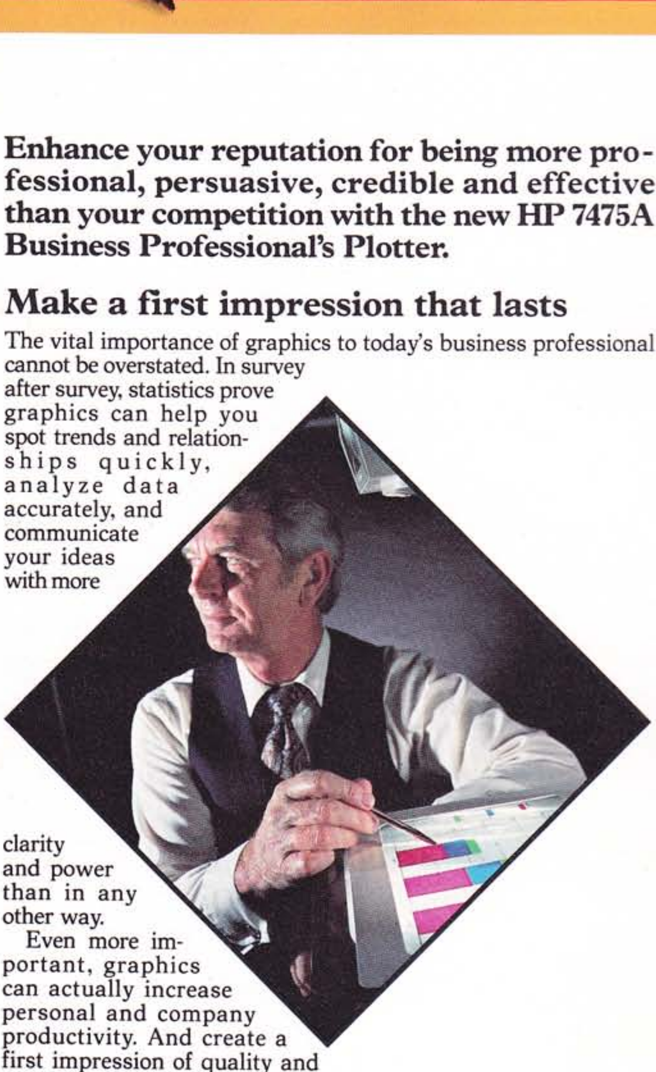
How HP business graphics

Enhance your reputation for being more professional, persuasive, credible and effective than your competition with the new HP 7475A Business Professional's Plotter.

Make a first impression that lasts

The vital importance of graphics to today's business professional cannot be overstated. In survey after survey, statistics prove graphics can help you spot trends and relationships quickly, analyze data accurately, and communicate your ideas with more clarity and power than in any other way.

Even more important, graphics can actually increase personal and company productivity. And create a first impression of quality and professionalism that lasts and lasts.



Graphics: the end to meetings that go nowhere

In a fascinating research project conducted by The University of Pennsylvania, 123 MBA candidates were involved in a study designed to test the effectiveness of business graphics in meeting situations. The results were startling. In the group where visual aids were used:

- **Meetings were shorter:** The study showed a 28% reduction in meeting length when transparencies were used.
- **Group consensus was faster:** Agreement was reached by 79% of the group using transparencies, compared with only 8% among the control group using no visual aids.
- **The decision process was accelerated:** 64% of study participants said they made their business decisions *immediately after the visual presentation.* When overheads were not used, the control group said they delayed decision-making until *some time after the group discussion following the presentation.*
- **Presenters with visual aids were perceived as being more professional, persuasive, credible and effective than those not using visual aids.**

Now, with the new HP 7475A Business Professional's Plotter, your meetings can have immediate and productive results like these.

How the quality look of HP graphics can help

The way you present your information can be equally as important as the actual information you're presenting. And that's where the new HP 7475A Business Professional's Plotter lets your professionalism shine through.

Standards unsurpassed in the plotter business

The technical standards of the HP 7475A have no equal for producing quality graphics. With a resolution of one-thousandth-of-an-inch, curved lines are smooth, not jagged, and straight lines are *consistently* straight. Its exceptional repeatability (the ability of a pen to return *precisely* to a given point) assures that intersecting lines and circular shapes will meet *exactly.* The result is *high-quality* charts and graphs you'll be proud to present.

Why 6 pens when experts say 4 will do?

Graphics industry experts maintain that good graphics contain four colors per chart. But Hewlett-Packard goes the experts two better by providing a six-pen carousel, so you can store and use pens of different widths—thick pens for bold headings and thin pens for details. And with six pens, you won't have to waste valuable time changing them. That's important when "the boss wants to see your presentation in twenty minutes!"

With the HP 7475A, you also get automatic pen capping to prevent pens from drying out between uses, and special "pen damping" (gently lowering the pen to the paper or transparency) to increase pen life and ensure better line quality... use after use after use. You also get a rainbow of 10 colors to choose from, in two line widths.

Your choice: 2 paper sizes and today's most popular graphics software packages

While most professional business applications will be satisfied with standard 8½ x 11" paper or transparencies, the HP 7475A adds the

can be the key to your success.

LOCAL AGRICULTURAL PRODUCTION
SALES VOLUME BY REGION
EFFECT OF VOLUME
PRODUCTION COST

capability of plotting on larger 11 x 17″ media, too. The larger plots are especially well-suited for time lines, PERT charts, schematics and engineering drawings.

Best of all, you don't have to be a programmer to produce quality graphics on the HP 7475A. It's supported by a variety of professional graphics software packages for both HP and non-HP desktop and personal computers.

Naturally, speaking of software compatibility leads us to hardware compatibility....

Compatible with almost any personal computer in the marketplace today

With two interfaces available, the HP 7475A quickly "makes friends" with most models of today's most popular personal computers, including IBM,® Apple,™ Compaq,™ Osborne® and Commodore™ --as well as a host of HP computers.

The cost? Surprisingly affordable

The new HP 7475A Business Professional's Plotter is an amazingly affordable $1895. When you consider that a typical fee for a single five-color transparency from a graphics service is $50—and that the same transparency can be prepared for about $1 in materials on the HP 7475A—the return on your investment is almost immediate.

Another choice: HP's low-cost, high performance Personal Computer Plotter

For the "business on a budget," you may also want a look at our 2-pen Personal Computer Plotter, the 7470A. Its low cost (only $1095) is as remarkable as the quality of its plots. With many of the same features as the new HP 7475A, the HP 7470A plots on a single paper size (8½ x 11″). It stores and caps two pens, and you can easily change the pens yourself for multi-color plotting. Best of all, the HP 7470A 2-pen plotter lets you turn your personal computer into a personal graphics workstation for only $1095.

Send for your FREE "Better Presentations Package" today!

For a FREE sample plot, overhead transparency, and more details, mail the coupon below today. We'll also enclose a list of software packages you can use with the HP 7475A or HP 7470A.

For the name of your nearest Hewlett-Packard dealer call toll-free 800-FOR-HPPC.

1101303

HEWLETT PACKARD

YES! I'm ready to gain a reputation for being more professional, persuasive, credible and effective than my competition. Please send me your FREE "Better Presentations Package," so I can learn more about the new HP 7475A Business Professional's Plotter and the HP 7470A Personal Computer Plotter. I understand I will receive this valuable package without cost or obligation.

Name__________ Title__________

Company__________

Address__________

City/State & Zip__________

Phone Number (_____)__________

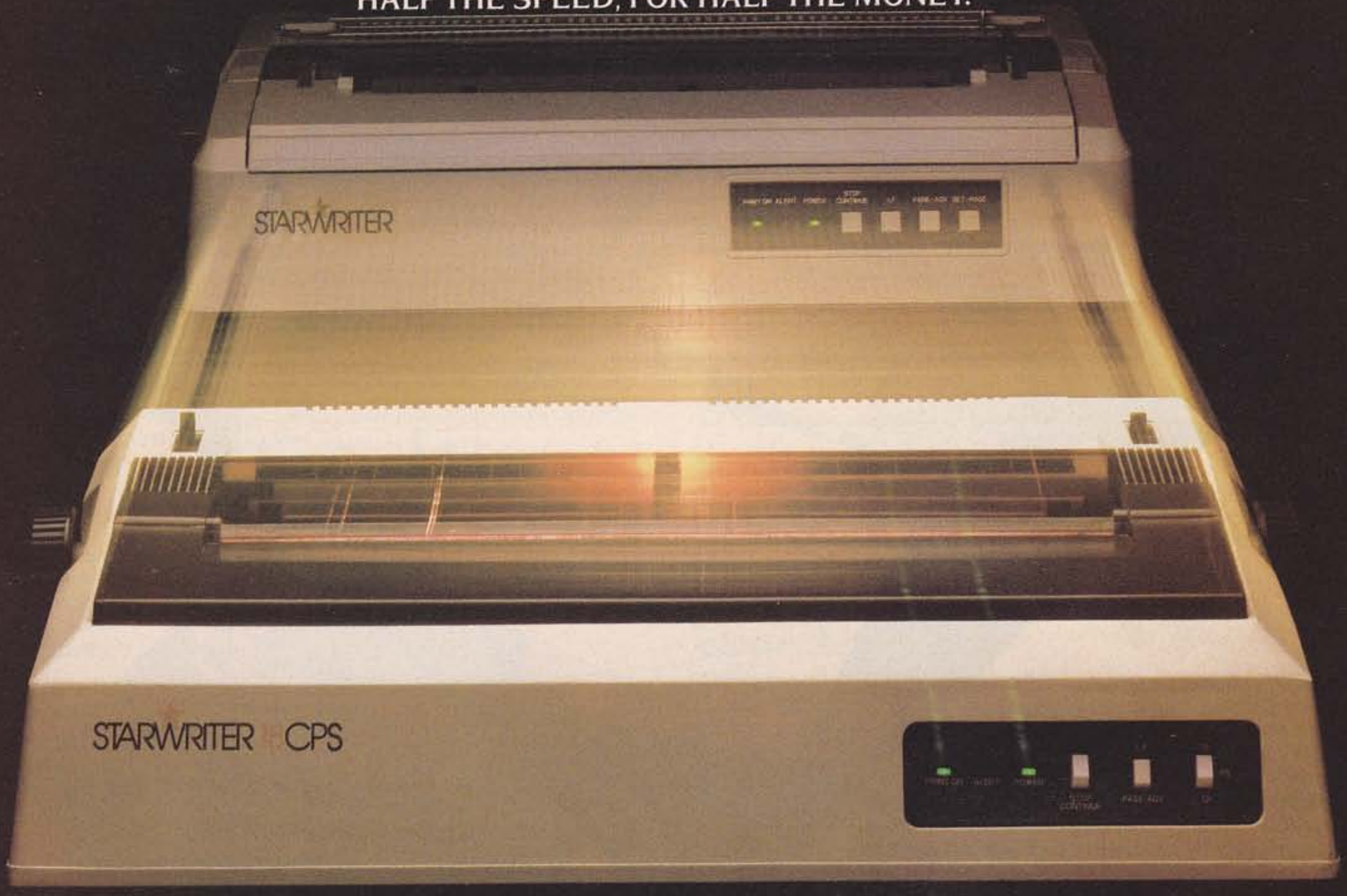
My computer is__________

Send to: Hewlett-Packard
16399 W. Bernardo Drive, San Diego, CA 92127
Attn: Marketing Communications

11303 PR4

SON OF STARWRITER™

HALF THE SPEED, FOR HALF THE MONEY.



First there was the Starwriter 40 CPS by C. Itoh, one of the world's most popular letter-quality printers.

And deservedly so. Because it gives you more of just about everything than any other printer in its price range (mid teens). And it churns out copy at a very brisk 40 characters per second, or about half a minute for an average business letter.

Now, there's the Starwriter 18 CPS™. It takes after its father, in that it's simply the finest printer you can buy for anywhere near the price—which in this case is just about half what Daddy charges.

The only major difference is speed.

Instead of 40 characters per second, this Starwriter trots along at just over 18 cps—which costs you about 30 seconds per average business letter.

But it retains the rest of the family resemblance, like low profile and low noise, plug-in compatibility with just about any serial or parallel microcomputer on the market, making it a perfect companion in a typical office environment.

And perfect for typical office chores: like letters, memos, announcements . . . in fact the vast majority of stuff that can afford to wait a few seconds to get typed.

Enough said?

If not, then this: the Starwriter 18 CPS gives you crisp, letter-quality copy (including boldface, underlining, sub and superscripts) with your choice of friction feed or optional tractor feed for precise print positioning of tabular and graphic data, using easily available industry-standard ribbon cartridges and long-lasting plastic daisy wheels.

But it also gives you something that's far from industry-standard:

A full-year warranty.

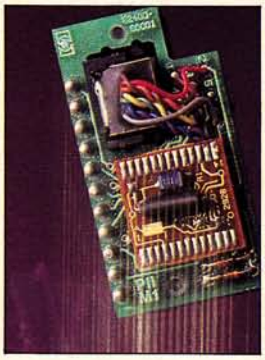
And for a mere half-a-minute per letter . . .

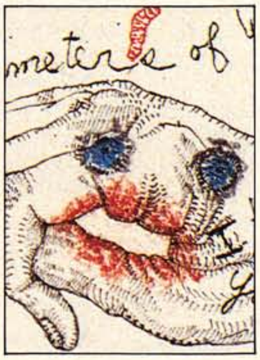
We think it's well worth the wait.

Marketed exclusively by
Leading Edge Products, Inc.,
225 Turnpike Street,
Canton, MA 02021,
1-800-343-6833 *or*
in Massachusetts
(617) 828-8150.

LEADING EDGE®

PROFESSIONAL COMPUTING





VOLUME 1, NUMBER 1

FEATURES

REVIEW: THE HP 71B: A FISTFUL OF POWER 18
It's not a pocket IBM 370, but it's close
By Phil Koopman

PUTTING A FINGER ON THE HP 150 30
A nuts and bolts look at the touch screen
By Bill Crow

THE SOFTWARE LIST 39
A comprehensive list of 150 third-party software
Compiled By Andrew Rosenbloom

SERIES 80 TALKS BACK 44
Here's how to make your computer talk—and why
By Loren Koehler

DATA HIGHWAYMEN 54
Identify how and by whom your data can be taken
By Harold J. Highland and Esther H. Highland

DEPARTMENTS

PROFILE/P. 7
SHORT TAKES/P. 11
NEW HARDWARE/P. 63
NEW SOFTWARE/P. 68
NEW LITERATURE/P. 74
CALENDAR/P. 75

COLUMNS

SERIES 40 FILE/P. 76
SERIES 80 FILE/P. 79
HP 150 FILE/P. 81
INSIDE HP/P. 82
ABOUT SOFTWARE/P. 84
USER'S EXCHANGE/P. 86

THE PROGRAM GENERATORS

SPECIALIZING IN HP SYSTEMS

WE GENERATE... SOLUTIONS...

- Custom software
- Conversions & Upgrades
- Interfacing problem solving
- System designs
- Hardware & software integration
- We offer training & support
- Comprehensive documentation
- Cost effective solutions
- Let our engineers save you time and money
- Ask about our software warranty

☐ Send me the AMS brochure

Name____________________

Company ____________________

Address ____________________

City_______ State_____ ZIP________

Telephone (____)________________

I have HP ____________________

I need software help ☐ Yes ☐ No

ams advanced microsolutions
530 Oak Grove Ave Suite 104
Menlo Park, CA 94025
(415) 325-7694

PROFESSIONAL COMPUTING

PUBLISHER
Mary E. Curtis

MANAGING EDITOR
Stewart Wolpin

ART DIRECTOR
Jean Knight

ASSOCIATE EDITOR
Andrew Rosenbloom

ASSISTANT EDITOR
Maggie Drury

EDITORIAL CONSULTANT
Ronald Cohen

DESIGN CONSULTANT
Steve Phillips Design, Inc.

CONSULTING TECHNICAL EDITOR
Don Person

CONTRIBUTING EDITORS
Bill Crow, INTEREX,
the International Association of
Hewlett-Packard Computer Users

Richard Factor
Martin Hanson
Harold Joseph Highland
Sam Lightman

ADVISORY EDITOR, PREMIER ISSUE
Colin Ungaro

ADVERTISING SALES DIRECTOR
Daniel S. Lipner

ADVERTISING / PRODUCTION ASSISTANT
Merle Beth Wise

Professional Computing is published bi-monthly by John Wiley & Sons Inc., Publishers, 605 Third Avenue, New York, N.Y. 10158
Kenneth B. Collins, Vice President.

Second class postage pending at New York, N.Y. Postmaster: Send address changes to Professional Computing, Box 1967, Marion, Ohio 43302.

Welcome to Professional Computing

With the excitement that surrounds the initiation of any new venture, we welcome you to the premier issue of Professional Computing magazine, the Authoritative Source for Hewlett-Packard PC users.

As an HP user you already know the value of a quality computer product. We at Professional Computing promise to provide our readers with the best editorial product on the market. An independent publication of John Wiley & Sons, Inc., Professional Computing is committed to helping you—the HP personal computer user—better perform your day-to-day activities.

A labor of more than a year's worth of planning, Professional Computing is the first magazine in Wiley's 175 years in publishing. Through painstaking research, we have come up with an editorial formula carefully crafted to serve the diverse interests of HP personal computer users. Moreover, we have found a real need in the marketplace for the information contained within these pages.

Each issue of Professional Computing will offer an editorial package of applications and technical features, the latest new product information from both HP and vendors with compatible products, news breaks to keep you up to date on the latest industry developments, and an exciting lineup of columns from HP personal computer experts.

In this issue, for example, you will find news stories on the 3.5-inch disk and how it is faring in the standards community, as well as a sneak preview of Nomad, HP's code-name for its anxiously awaited portable computer.

Among the features are an in-depth review of the powerful little HP 71B; a nuts-and-bolts look at the touch screen HP 150, including invaluable independent software vendor listings; a technical piece about speech synthesis on the Series 80, and an intriguing overview of personal computer security.

We are sure that at least some of these articles will elicit reactions from our readers. We invite—indeed, encourage—your comments and questions regarding Professional Computing articles or your general experiences with HP personal computers.

In addition to a letters column that will appear in future issues, a Users' Exchange will give you the opportunity to seek economical personal computer advice from experts in the field. This column will appear in every issue.

Accompanying this will be "About Software," which will direct you to software in the public domain. Meanwhile, specific "Files" on the Series 40, 70, 80, 100 and 200 will alternate from issue to issue.

The editorial quality of this or any magazine is, however, only as good as the staff behind it. Recognizing this, Wiley has gathered some of the most experienced editors in the computer field today. In addition to our full-time staff of editors in New York City, we have assembled a nationwide network of contributing editors, who will ensure a broad range of coverage.

We hope you will find Professional Computing a helpful tool. Please let us know how we can better perform this service. We pledge to respond with the type of information that will not only entertain, but make this magazine an essential part of your work day.

Mary E. Curtis
Publisher

WE PUT YOU AT THE LEADING EDGE OF COMPUTER TECHNOLOGY.

New titles in systems design, applications programming, and software development, from John Wiley & Sons.

ADVANCED PROGRAMMING

A Practical Course
D. W. Barron, *University of Southampton, U.K.* and J. M. Bishop, *University of the Witwatersrand, South Africa*

A practical guide to programming emphasizing systematic design, construction and verification. Focuses on the design of algorithms, data structures and input-output.
(1-90319-1) approx. 280 pp. Aug. 1984
$24.95 (tent.)

USING BBC BASIC

P. J. Cockerell, *University of Kent at Canterbury, U.K.*

Covering all features of the BBC microcomputer, this is a complete guide to advanced programming in BBC BASIC. Offers special guidance on BBC graphics and the use of the BASIC Assembler.
(1-90242-X) 352 pp. 1984
$16.95

SOFTWARE DEVELOPMENT

Manual for the Planning, Realization, and Installation of DP Systems
Wolfgang End, Horst Gotthardt, and Rolf Winkelmann

A practical, systematic approach to improving software quality and reliability from conception to release, including the selection and use of aids for program execution and maintenance.
(1-26238-2) 345 pp. 1983 $49.95

NEW INFORMATION TECHNOLOGY

Alan Burns, *University of Bradford*

A detailed survey of a wide range of current information technologies, including state-of-the-art data and information processing, democratic systems design, on-line information systems, and intelligent knowledge-based systems.
(0-27494-8) approx. 254 pp. 1984
$41.95

APPLICATION PROTOTYPING

A Requirements Definitions Strategy for the '80s
Bernard H. Boar, *AT&T, New Jersey*

The first comprehensive guide to applications prototyping, a revolutionary new strategy for obtaining good requirements definitions in systems development. This how-to-do-it guide explains the concept of prototyping and shows how to introduce it into a business organization, with specific advice on selecting prototyping software and resolving project management issues, plus an in-depth case study.
(1-89317-X) 210 pp. 1984 $30.00

INTRODUCTION TO LOCAL AREA COMPUTER NETWORKS

Kirk C. E. Gee, *Consultant with National Computing Centre Ltd., Manchester, UK*

A collection of cutting edge techniques now being used to implement local area networks. Examines topologies, transmission media and access methods, and major requirements for hardware and software. A detailed explanation of the basic technology is provided.
(1-80036-8) 160 pp. 1984
$16.95

DICTIONARY OF COMPUTERS, DATA PROCESSING AND TELECOMMUNICATIONS

Jerry M. Rosenberg, *Rutgers University*

This definitive reference source is the first to encompass computer technology, data processing, and telecommunications, defining more than 10,000 terms, symbols, acronyms, and abbreviations used in these fields.

(1-87638-0)	614 pp.	1984	$29.95 Cloth
(1-88582-7)			$14.95 Paper

THE MICROCOMPUTER USERS' HANDBOOK, 1983–84

Dennis Longley, *Brighton Polytechnic, U.K.,* and Michael Shain, *National Computing Centre, U.K.*

A comprehensive *annual* reference designed for business users of microcomputers. Addresses the various factors a prospective buyer must consider when purchasing a system, and examines the functions and peripherals of a variety of micros—*over 150 models in all.* Appendices list leasing, insurance, and service organizations; 1,000 agents worldwide, tables of price ranges, and glossary of terms.
(1-80436-3) 324 pp. 1983 $39.95

THE DATA RING MAIN

An Introduction to Local Area Networks
David C. Flint, *Butler Cox & Partners Limited, London*

An introduction to local area networks, describing what they are, what they can do, and how they can be used effectively to link together the components of computing/communications systems in business and industry.
(1-26251-X) 375 pp. 1983 $39.95

DATA DICTIONARY/DIRECTORY SYSTEMS

Administration, Implementation, and Usage
Belkis W. Leong-Hong, *Department of Defense, Washington, D.C.* and Bernard K. Plagman, *The Plagman Group, Inc., New York*

Comprehensive guide to data system design, implementation, and control using Data Dictionary/Directory Systems—one of today's most powerful tools for managing an organization's information resources. Presents the underlying theoretical concepts of DD/DS design, guidelines for evaluating and selecting a DD/DS package and strategies for system development.
(1-05164-0) 328 pp. 1982 $33.95

STRUCTURED SYSTEMS DEVELOPMENT TECHNIQUES

Strategy Planning to System Testing
G. L. Collins and G. L. Blay, *both of BIS Applied Systems Ltd.*

A full set of *compatible* techniques for the entire system development process, from strategic planning through testing. Field-tested at over 100 locations, here are comprehensive methods for system and project development, plus specific analytic techniques, designed to ensure systems that meet user needs, and are easy to develop and maintain.
(1-88773-0) 350 pp. 1983 $24.95

THE DESIGN AND DESCRIPTION OF COMPUTER ARCHITECTURES

Subrata Dasgupta, *University of Southwestern Louisiana*

(1-89616-0) approx. 400 pp. 1984
$37.95

PROPOSAL PREPARATION

Rodney D. Stewart and Anne L. Stewart, *both of Mobile Data Services*

(1-87288-1) approx. 352 pp. 1984
$32.95

COMPUTER GAME-PLAYING

Theory and Practice
Edited by M. A. Bramer

(0-27466-2) 306 pp. 1983 $59.95

CRYPTOGRAPHY: A NEW DIMENSION IN COMPUTER DATA SECURITY

A Guide for the Design and Implementation of Secure Systems
Carl H. Meyer and Stephen M. Matyas, *both of IBM Corporation*

(1-04892-5) 755 pp. 1982 $47.95

To order, write to Lisa Sullivan, Dept. 5-1062

JOHN WILEY & SONS, Inc.
605 Third Avenue
New York, N.Y. 10158
In Canada: 22 Worcester Road, Rexdale, Ontario M9W 1L1

For faster service call toll free:
1 800-526-5368.
Order Code #5-1062. VISA, MasterCard, American Express accepted on phone orders.

Prices subject to change and higher in Canada. 092-5-1062

PROFILE

Cyril Yansouni: HP veteran takes risks

BY STEWART WOLPIN

Cyril Yansouni does not immediately evoke the image of an average corporate executive. There is no three-piece suit, no private office. In fact, the corporate image is the one personality style that the genial general manager of Hewlett-Packard's Personal Computer Group rarely exhibits. Instead, there is the dedicated and loyal employee. At other times, there is the fanatical, white-coated lab technician. And most of all, there is the humble star who refuses to take credit for his record-setting achievements, pointing instead to his teammates as the sole reason for his success.

The Egyptian-born Yansouni is in the spotlight now because of his work within the Personal Computer Group, and his combining of two previously highly competitive groups—the Palo Alto division, responsible for the Series 100, and the Corvallis, OR, division, or portable division, responsible for the Series 10, 40, 70 and 80.

Yansouni's lack of stereotypical corporate executive personality is easily explained. As general manager of the newly formed PC group and heralding HP's entrance into the mainstream personal computer market, he holds only a master's degree in electrical engineering—and nothing but seat-of-the-pants training in corporate affairs.

"I would not characterize my career through Hewlett-Packard as a meteor. I've been with Hewlett-Packard for almost 17 years, so I would characterize myself more as a product of the Hewlett-Packard culture," says Yansouni, the loyal company employee, in a lilting, slightly accented Arabic baritone.

To the casual industry watcher, HP does not seem a company that takes risks. Even Yansouni, who looks younger than the 42 he will turn on June 11, admits that the firm represents the utmost in fiscal and marketing conservatism. But Yansouni adds that conservatism in corporate affairs is offset by HP's damn-the-torpedoes approach in research and development, thereby maintaining its position on the cutting edge of technology in an ever-changing marketplace.

Says Yansouni the engineer, "There are so many opportunities to innovate, to create. We have an environment in which you can take some risks and you don't get penalized."

"We have an environment in which you can take some risks and you don't get penalized."

LEARNING FROM MISTAKES

This philosophy was aptly illustrated when the Corvallis Division took some R & D risks and ran into some cost overruns resulting from "some ambitious plans that didn't materialize," recalls Yansouni.

"Any other company would have taken a piece of paper and said, 'Okay, we have 300 to 400 people—too many, bye bye'."

Instead, Yansouni and HP went through a period of "painful" reevaluation, making sure all 300 to 400 people were found positions eleswhere in the company.

Adds Yansouni, "You have to have that attitude toward life. I left Egypt when I was 17. I went to Belgium; I didn't know anybody, so that was a risk. Six, seven years later, I decided to come here and the only person I knew was John Linvill."

Dr. John Linvill was dean of the electrical engineering school at Stanford, alma mater of HP founders William Hewlett and David Packard. Linvill was on a research tour of Europe in 1965 when at the University of Louvain in Belgium he discovered Yansouni doing similar research. After befriending and making a presentation to the American scientist, Yansouni was invited by Linvill to do graduate work at Stanford on a fellowship.

While working on his master's in 1966-67, Yansouni interviewed at several corporations in the Bay area. Four days after his 25th birthday and the day after his final exams, Yansouni joined HP as an R & D engineer in the microwave division.

"I had no specific career goals," recalls Yansouni. "I felt I wanted to be successful. I wanted to get my chance after a couple of years to manage a project."

It was actually five years before Yansouni was given that opportunity. In 1972, HP started its Santa Rosa Division, an outgrowth of the Palo Alto operation. Five individuals were charged with making that division go: the division manager, the marketing manager, the manufacturing manager, the personnel manager and the R & D manager—Yansouni.

"You take a person after five years in the company, not native, who came to the United States six years ago and said, 'Go and start, be part of this start-up team,' I think that's a sign of confidence."

HP had plans for Yansouni, and his own comparatively minor ambitions happened to coincide.

"I felt I had some characteristics that would serve HP in international markets, especially since I was bilingual, maybe even trilingual at the time," explains Yansouni. "I felt that

continued

PHOTOS BY LEN LAHMAN

continued

the future growth of the company would be in computers and I always felt that the international markets were important."

HP had plans to manufacture and market computer products in Europe, specifically the Series 1000, from a plant in Grenoble, France. He asked the company to be part of the start-up team there, despite having no previous background in computers or marketing.

"That was another risk. I wanted to do something completely different from what I had done in the past. I wanted to be involved with computers and I wanted to be involved with HP in Europe, and HP said o.k."

Perhaps it was not as big a risk as either Yansouni or HP might have thought. A year later, the division manager was recalled to the U.S., and Yansouni took over as general manager of the division of more than 200 people, something Yansouni calls a "controlled risk."

LEARNING ABOUT MICROS

Five years later, after appointing an overseer at the now 900-employee Grenoble Division, he came back to Palo Alto to oversee two additional plants: Sunnyvale, CA, and Puerto Rico, both part of the Data Terminal Division.

"HP is very strong in CRT terminals," he says. "They are very intelligent workstations. We looked at our future plans and they started to look more and more like personal computers."

At that time in 1981, there were numerous divisions within HP all trying to address the personal computer market, especially Yansouni's Corvallis Division—which had begun mass marketing the 41C and the 75C—all from their own particular marketing points of view.

"It came very quickly to our attention that we were only going to be successful if we had a very coordinated and focused effort in the marketplace."

Yansouni seemed the logical manager to carry out the unification. It merely required bringing in the other PC-type divisions, including the one producing the Series 80 scientific and engineering machines, the 125 and the just-introduced 120 CP/M-based workstation, under the same divisional umbrella.

"Its mission," says Yansouni, "was to focus on the personal computer market."

In January 1983, the IBM PC was fast becoming the major force in the personal computer industry. Nine months later the HP 150 Touch Screen computer evolved from the Data Terminals Division, which was under Yansouni's stewardship. But to compete in the mainstream personal computer market, and especially with IBM, Yansouni believed that HP would have to take another risk: abandon HP's commitment to proprietary systems and use what was already available.

That effort resulted in the September 1983 introduction of the 150.

Some things, of course, never change. HP and Yansouni maintained their technological and proprietary integrity by deciding to go with a 3.5-inch disk drive rather than a 5.25, to introduce the touch screen as a standard rather than an option and to price the 150 $1,000 more than the "standard" IBM PC. These were things industry analysts shook their heads at when the machine was first introduced.

Counters Yansouni, "Our success is based on innovation and not just perceived innovation. We're not going to compete on price or marketing strategy. The challenge is: can industry standards be a hindrance to innovation?"

Yansouni—who lives with his wife of 18 years, Jeanne, his two children, Laura, 16, and Bert, 14, and two cats in a Spanish-style home in Los Gatos—hopes that he and HP have and will continue to answer that rhetorical question with successful product. This includes the HP 110 portable lap computer expected to be introduced next month and the updated 150, expected before the end of the year.

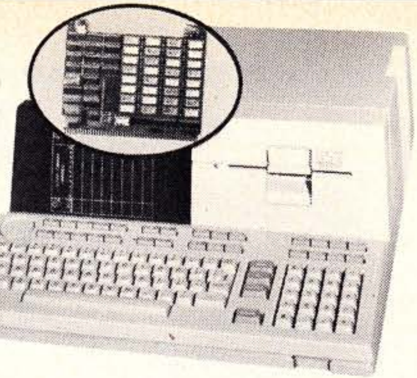
Through it all, Yansouni will sustain his various personnas—the loyal employee, the engineer and especially the humble team player—without realizing that these personalities are what make up a team within himself, a proven successful team.

"I don't think I can do it on my own," Yansouni insists. "An effort like this can only happen if the whole team is doing it. Forget about the past, forget what it means to me. If it's all right for the team, it's all right for me."

"We looked at our future plans and they started to look more and more like personal computers."

GREAT NEWS FROM EVENTIDE

FOR HP DESKTOP COMPUTER USERS



Now There's an Exclusive Source For Advanced Memory And Other Enhancement Products To Help You Get More Performance From Your Hewlett-Packard Desktop Computer

EVENTIDE makes the best line of desktop computers even better, with advanced memory and enhancement peripherals. We concentrate our R&D efforts on HP desktop computers exclusively. The result is a growing series of products that make your machine perform smarter, faster and better. Several of our products are Eventide exclusives—offering capabilities even HP itself doesn't supply. And in every case, our pricing, availability and warranty terms are unbeatable.

ROM ENHANCEMENTS ADD NEW CAPABILITIES TO HP 9845

MEMORY MASS STORAGE RAM ELIMINATES DISK & TAPE! PROGRAMS RUN FAR FASTER

Eventide offers a unique series of ROM enhancement options for its WMAZ-4 memory board series for 9845 computers.

Take our MEMORY STORAGE ROM, for example. It's another Eventide first. With the MMS ROM, you can utilize the high-density capacity of Eventide WMAZ-4 boards to emulate disk or tape storage. Up to 1.5 Megabytes of RAM storage is available with three WMAZ-4 boards. Just imagine! Your 9845 can now be the equivalent of a Half-Megabyte mainframe with a double-sided 8″ disk running at memory speed!

Programs which access mass storage frequently can run up to several hundred times faster. Some applications, such as real-time data gathering and reduction might simply be impossible without this new Eventide ROM. And of course, disk and tape wear, as well as noise and search time, are reduced to almost zero.

Get details on the full series of Eventide ROM enhancement options.

MORE MEMORY AT LOWER COST FOR HP 9845 AND 9816/26/36 (SERIES 200)

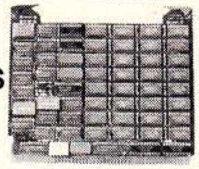
Eventide's WMAZ-4 quad density memory board gives your 9845 B/C/T computer 512K bytes for just $3500. Up to three WMAZ-4 boards can be accommodated in your 9845. For added performance, WMAZ-4 boards accept Eventide's ROM enhancement options. A half-populated board (256K bytes) is also available.

For HP 9816/9826/9836 (Series 200) machines, Eventide's WKBP-4 quad density 256K byte boards give you the memory you need, at the lowest price. Compare our prices ($749 - $549 depending on quantity) with HP's. And compare delivery times. We can usually deliver from stock; others can make you wait for months!

YOU CAN DEPEND ON EVENTIDE . . .

. . . Hundreds of FORTUNE 500 companies, government agencies and educational institutions do. They know that Eventide's prices and delivery schedules can't be beat. And they rely on our FULL ONE YEAR WARRANTY—that's *four times* as long as HP's own warranty. Since 1971, Eventide has been a leading manufacturer of digital signal processing equipment, as well as HP computer peripherals. For immediate answers to any questions—technical or otherwise—just pick up the phone and call us at (201) 641-1200.

NOW EVENTIDE BREAKS THE MEGABYTE BARRIER FOR SERIES 200 MACHINES



WKBP-16 MEMORY BOARD QUADRUPLES MEMORY DENSITY FOR HP9816

Now for the first time, HP9816 users can add a full megabyte of memory without adding an expensive expansion interface. Eventide's new WKBP-16 Memory Board plugs right into the 9816 (and all series 200 desktop computers.) Not only do you save the cost of the expansion interface, but you avoid the performance slowdown inherent with the use of the expansion interface. This new Eventide product employs 256K RAM chips to achieve this unprecedented memory density. Best of all, you can get this added memory and performace now . . . WKBP-16 Megabyte Memory Boards are available immediately from stock in limited quanitities.

IF YOU USE HP DESKTOP COMPUTERS, YOU WON'T WANT TO MISS UPCOMING EVENTIDE NEW PRODUCT ANNOUNCEMENTS

New Products and coming attractions from Eventide for your HP desktop include:

- CRT GRAPHICS — monochrome or color — for 9825, 9835, 9845 machines. An economical update for these fine computers.
- GpiBUF spooler/data buffer stores over 200KBytes of data for later transmission to printers, plotters, etc.
- GPIPROM Programs EPROM's rapidly and efficiently directly from HP-1B. Software support for most HP desktops is available.
- BUBBLE MEMORY for 9825, 9835, 9845 allows high-speed permanent storage without lugging disks "in the field" or relying on tapes.

Plus more new ideas and peripherals for your HP desktop computer.

If you're not yet on our mailing list, you owe it to your computer to call us or write . . . Just take a moment now and we'll keep you up-to-date from now on.

Eventide

One Alsan Way
Little Ferry, N.J. 07643
(201) 641-1200

YOU HAVE SPECIAL PROBLEMS.

WE HAVE SPECIAL ANSWERS.

At Applied Software Technology, Inc., our expertise is your expertise. We specialize in Engineering design, management and custom software development for the microcomputer. And we understand your business, because we're engineers, too.

We have our own software available, in addition to third party software and selected hardware. And we offer custom implementation of public domain software such as HEC-2, STABL3, DAMS2 and more.

Although Engineering is our specialty, we offer assistance to many other related fields such as Architecture and Construction. Give us a call today at (404) 892-1339. And put us to work on your special problems.

APPLIED SOFTWARE TECHNOLOGY, INC.©
WE BUILD SOLUTIONS.

Applied Software Technology, Inc., Advanced Technology Development Center,
Suite N210, 430 Tenth Street, Atlanta, Georgia 30318

hp HEWLETT PACKARD
COMPUTER PRODUCTS
VALUE-ADDED SYSTEM SUPPLIER

Setting the standard for the 3.5 disk

"Within five years, the 3.5-inch floppy disk will represent two to five times the volume of 5.25-inch disks presently available."

This prediction was made not by an employee of Hewlett-Packard or Apple or Sony, the firms with the most at stake in the success of the 3.5-inch format, but by Bill Proctor, a senior staff engineer at Data Encore of Sunnyvale and a member of the X3B8 committee preparing the paper on the standardization of the 3.5-inch disk. The committee is the first step toward eventual adoption of the 3.5-inch format as a standard by the American National Standards Institute (ANSI), although it is not officially a part of the standards group.

The technical paper and ballots were mailed to the 79 member companies of X3B8 on Feb. 15 and were required to be returned by March 22. The expected affirmative results are expected to be announced later this month. Once approved, the paper will move on to ANSI's X3 committee, then to the general ANSI membership for publication and submission to the International Standards Organization (ISO) at its annual September meeting.

Proctor believes the attention the 3.5-inch format has received from major hardware and software vendors, which the 5.25 format did not initially receive, as well as its technological advantages in additional and better protected memory, will result in greater acceptance in the long run.

FUJI FILM
SONY

WILL THE **3.5-inch disk eclipse its 5.25-inch counterpart?**

The push for standardization was initiated by Sony, which supplies the drives used by HP in the HP 150 Touch Screen computer, and Verbatim Corp., a diskette manufacturer. The standardization paper was heavily influenced initially by the two vendors, HP and later by Apple, which utilizes the 3.5-inch format in its Macintosh computer.

The X3B8 committee will also be writing standardization papers for the 3-inch format—sponsored mainly by Hitachi and Maxell—and the 3.25—pushed mainly by diskette maker Dysan. All three, according to X3B8 officials, received equal attention when first introduced in committee. The 3.5-inch format was ballotted first because the authors of the draft standard were ready before the others.

The X3 committee's 20 to 30 members are expected to act within 15 days of receiving the voting result from the X3B8. Following the X3's expected approval, the paper will be passed to ANSI, which will publish the paper and invite public comment. The public comment portion of the procedure will take four months. Any negative comments will be passed on to X3B8 before an ANSI membership vote on the paper. Proponents of the standard hope that it will be adopted in time for the ISO meeting.

The standard was written specifically to include HP and not exclude Apple, says Proctor. For instance, the standard specifies a disk be able to run on drives at speeds of 300 RPM to 600 RPM. The Apple drives vary between those two speeds, while the HP drive included in the 150 operates at 600 RPM. The standard also includes disks that run at 135 tracks per inch (TPI), which excludes many lower-end Japanese computer drives that run at 67.5 TPI. The standard also includes all density/sided combinations, including the soon-to-be released Sony double-sided disk (pictured).

Hardware and software manufacturers that produce 3.5 products that meet the standard will be able to point that out in advertisements after purchasing the standard from ANSI, assuring consumers that their products meet all required machine specifications.

Although the standard as written will probably meet little resistance in ANSI, it could encounter roadblocks at the international level because of the plethora of Japanese products that don't fall within the specifications.

Arresting software pirates

Software duplication by users seems like a technological fact of life these days. But at least one state is moving to erase this practice through legislation.

"Preventing unauthorized duplicating and distribution of software is critical to the software industry," says W. Krag Brotby, chairman of the Westlake, CA, Vault Corporation, which recently sponsored a news conference by Louisiana Secretary of State James H. Brown. Vault develops and markets copy protection systems that prevent unauthorized duplication of software.

PROFESSIONAL COMPUTING Shares The Knowledge.

Software Reviews New software for various HP models in various formats. In-depth reviews of core software. Pros and cons on electronic spreadsheets, database management, datacommunications, etc.

Hardware Reviews Equipment and internal architecture; how it impacts software capabilities.

Buyer's Guide What non-HP equipment can be used with your HP equipment and which works best. Dimensions, statistics, evaluations.

New Product Update User evaluations of software and hardware

User's Exchange Share problems and solutions, unique applications.

Book Reviews The newest literature on every aspect of the field.

PROFESSIONAL COMPUTING is a bi-monthly publication of John Wiley & Sons—one of the oldest and most distinguished publishers of scientific and professional books and journals. Its broad range of offerings in computer books, electronic publishing and software make it a leader in this dynamic growth area. PROFESSIONAL COMPUTING brings to bear John Wiley's credibility and track record in science and business in this major new magazine.

Wherever men and women are using Hewlett-Packard systems to change the course of history...or chart the growth of business...or provide the data that keeps hearts ticking and minds alive—PROFESSIONAL COMPUTING will be there to stimulate your thinking and push you towards your goals.

PROFESSIONAL COMPUTING is the first HP/PC magazine to give you information specifically related to your business and technical needs. To tell you of new advances...promote good ideas...explain innovative applications...and present time-saving software.

- In easy-to-read articles, software and hardware reviews, business updates, new product releases, tutorials, and programs.
- In a readers' forum that rounds out the exchange between editors, writers and users...
- In an easy-to-read format with full color photographs, and easy-to-read diagrams...

Subscribe now to PROFESSIONAL COMPUTING— and achieve.

TO EXPEDITE YOUR ORDER FOR PROFESSIONAL COMPUTING

CALL US TOLL FREE AT (800) 526-5368

IN NEW JERSEY CALL COLLECT (201) 342-6707

We'll send you 6 Issues of Professional Computing for only $30

A new magazine for Hewlett-Packard Owners + Users

PROFESSIONAL COMPUTING

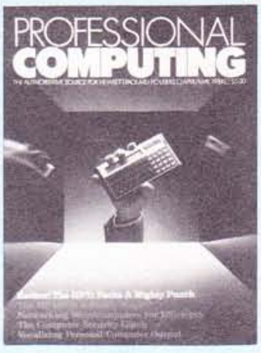
☐ YES! Please send me 6 issues of Professional Computing for only $30. If at any time I wish to cancel my subscription I will receive a refund for issues due.

Name__________________________

Address__________________________

City____________ State______ Zip______

Please allow 4-8 weeks delivery of the first issue. D 34-101



We'll send you 6 Issues of Professional Computing for only $30

A new magazine for Hewlett-Packard Owners + Users

PROFESSIONAL COMPUTING

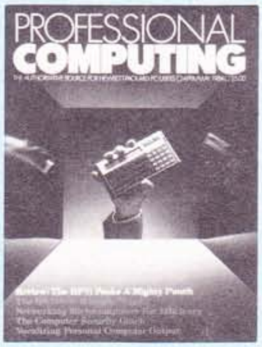
☐ YES! Please send me 6 issues of Professional Computing for only $30. If at any time I wish to cancel my subscription I will receive a refund for issues due.

Name__________________________

Address__________________________

City____________ State______ Zip______

Please allow 4-8 weeks delivery of the first issue. D 34-101



We'll send you 6 Issues of Professional Computing for only $30

A new magazine for Hewlett-Packard Owners + Users

PROFESSIONAL COMPUTING

☐ YES! Please send me 6 issues of Professional Computing for only $30. If at any time I wish to cancel my subscription I will receive a refund for issues due.

Name__________________________

Address__________________________

City____________ State______ Zip______

Please allow 4-8 weeks delivery of the first issue. D 34-101

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 660 MARION, OHIO

POSTAGE WILL BE PAID BY ADDRESSEE

Professional
Computing
P.O. Box 1967
Marion, Ohio 43306

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 660 MARION, OHIO

POSTAGE WILL BE PAID BY ADDRESSEE

Professional
Computing
P.O. Box 1967
Marion, Ohio 43306

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 660 MARION, OHIO

POSTAGE WILL BE PAID BY ADDRESSEE

Professional
Computing
P.O. Box 1967
Marion, Ohio 43306

NO MORE CARDS?

TO EXPEDITE YOUR ORDER FOR PROFESSIONAL COMPUTING

CALL US TOLL FREE AT (800) 526-5368

IN NEW JERSEY CALL COLLECT (201) 342-6707

continued

Brown says that legislation "to prevent the unauthorized duplication and distribution of computer software" would make Louisiana the first state to take such action. The bill will be introduced by State Senator William Atkins and Representative Al Ater, both Democrats.

This legislation, says Brown, will "strengthen significantly the ability of software publishers and distributors to enforce their rights under trade secret and copyright law." One of the bill's main goals is to attract high technology companies to Louisiana, he adds.

MILLIONS IN LOST REVENUE

Software duplication cost publishers about $360 million in lost wholesale revenue in 1983 and is expected to be as high as $500 million in 1984, says Brown.

Called the "Software License Enforcement Act," the bill essentially states that "if a party acquiring the software uses it, or opens the package, he or she will be deemed to have accepted certain specific terms, if those terms are contained in the accompanying license agreement, making the person a licensee of the software publisher."

Brown says that this bill "strikes a balance between the legitimate interests of the software industry in preventing piracy and the legitimate interests of the customers who acquire copies of software pursuant to license agreements (back up copies)."

Whether this type of legislation will catch on nationwide is still unclear. But perhaps a more important question is whether the bill is enforceable once it becomes law. "I wonder how a law like the one proposed will automatically prevent users from what is today a very common practice—running several copies of a purchased program," says one user.

A Hewlett-Packard spokesman declined to comment directly about the Louisiana bill except to say that HP is "looking at the matter with great interest."

New markets announced for the 150

Hewlett-Packard has completed phase one of its move into the mainstream computer market—the introduction and acceptance of the HP 150. It is now time for phase two: the marketing.

The marketing is taking on two forms: selling the 150 for office use and for medical use, and each is taking on its own market in its own way.

"We can't beat IBM," asserts Joe Schoendorf, general manager of HP's Systems Marketing Center. "We're going to be number two in office automation in two to three years."

HP executives realize that competing with Wang, DEC, Prime, Digital Research and Sperry in office automation means being able to trade information and files with IBM equipment as well as its other competitors' gear. So HP has and will introduce a number of products to allow interfacing and trading of data between the 150 and other vendors' products, both micro and mini.

The family of products to do this will be marketed under the name AdvanceNet. The concept is to link from four to 400 micro/workstations, including other vendors' machines, through the HP 3000 minicomputer. Eventually, it will mean a local network designed specifically for this purpose.

But for now, the initial entries include two products that interface with the IBM PC. The first is DSN/Monitor, a step up from the previously released DSN/Link. Monitor will allow the exchange of files from an IBM PC to a 150 in conjunction with Link, which moves files in the opposite direction. Monitor and Link can be connected either through a modem or hardwire.

Both software products are designed for use only in the 150.

The other product is an IBM 3278 terminal emulation board with three overlays, two aluminum for functions and one plastic for the keyboard, to allow the 150 to emulate the IBM 3278. An update in early summer will allow up and down loading of files from the 3278.

HP has also introduced the concept of a complete HP office, named the Personal Productivity Center (PPC), which would provide office professionals, support people and secretaries with word processing, personal file and calendar management, graphics, spreadsheet analysis and data processing, all by taking advantage of both micro and mini capabilities.

AdvanceNet will also include PBX capability. HP has already signed or is in the process of signing agreements with three PBX companies to develop HP-compatible PBX products. Also planned is a data base manager called ESVAL.

The PPC might consist of several 150 workstations for managers, HP 2628 secretarial workstations and a 3000 mini.

"The 150 was designed as the manager's workstation in the office," says Schoendorf. "Messege one was touch. Now we're going to a broader step."

MEDICAL MARKETS

The marketing of the 150 to the lucrative medical field takes on a slightly different tack. Instead of heavy advertising and media messages and the creation of systems, HP is offering a one-step buying opportunity for those who already utilize HP medical equipment and computers.

There will be no physical difference in the 150 sold to this market. The only hardware option will be a special package of the 150 and a 5M byte Winchester drive. All HP equipment will also have programs that will allow communications between the 150 and other laboratory equipment for more accurate clinical record keeping and diagnosis.

HP also plans to develop its own and third-party software for both clinical and financial applications. When the medical 150 concept is offi-

continued

cially unveiled on May 1, there will be five packages available, with 15 to 20 by the end of the summer, says Medical Product Group Manager Jeff Carlisle.

HP also plans on-line software support for health care professionals and a toll-free support number: 800-HPCOACH.

Built-in software key to HP's Nomad portable

Hewlett-Packard's drive into the mainstream office automation market has not yet hit full speed, but several personal computer developments during the next few months may change that.

Aside from HP 150 revisions expected later this year, the company is readying a portable computer, code-named Nomad, that HP plans to unveil in May during the Comdex spring convention in Atlanta.

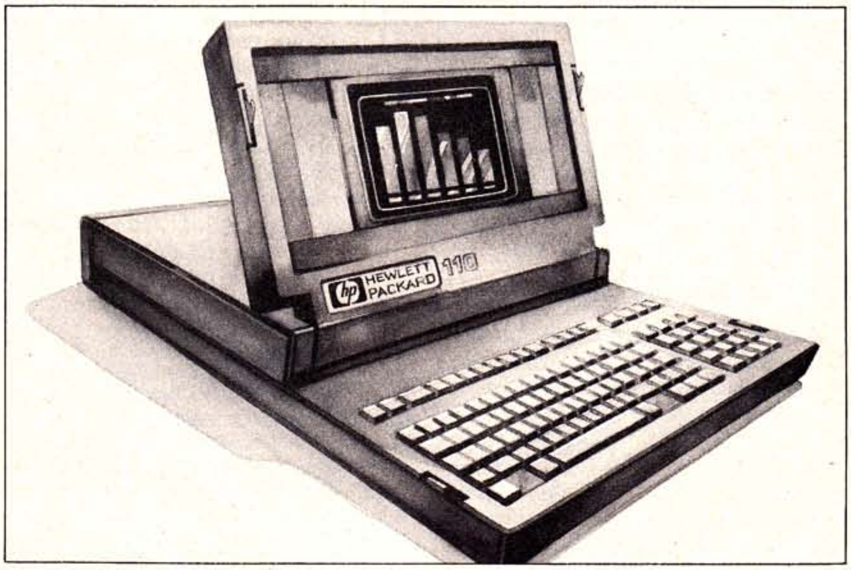
The introduction of Nomad is the first of several machines that HP believes will allow the company to eventually capture about 30 percent of the portable computer market, says Bob Ulery, product marketing manager, personal computers, HP Portable Computer Division, in Corvallis, OR.

But the fight for market share will probably not be easy, considering the proliferation of portables available today or planned for the coming months. Even IBM has thrown its hat in the portable computer arena.

To combat this onslaught, says Ulery, "We will try to set the standard. Nomad must be as good or better than anything on the market." Just how good Nomad really will be is hard to determine because details about the machine were only sketchy at press time.

NO MORE NUMBERS

Borrowing a marketing technique from rival IBM, HP has apparently abandoned its often confusing product numbering scheme for more simplified names. Thus Nomad—internally numbered the HP 110—will be called The Portable from Hewlett-Packard. The first device to follow this labeling strategy was the Think-Jet printer (see New Hardware, p. 63).



AN ARTIST'S **rendition of the HP 110, The Portable Computer.**

Although HP is not releasing much information about the battery-operated Portable, one informed source says the 9-pound machine will sell for about $3,000. Moreover, The Portable will feature built-in programmed ROM chips containing such popular software as Lotus 1-2-3. These ROMs are expected to have word processing and communications software as well. Such features will allow the convenience of using the machine immediately, without plugging in applications software on disks.

The HP-150-compatible Portable, according to the source, is a 16-bit machine with a 16-line by 80-character LCD display. Its physical dimensions are expected to resemble that of a standard 3-ring binder, about 3 inches thick.

Like the 150, the Portable will use 3.5-inch disks, says the source, but will not have a touch screen.

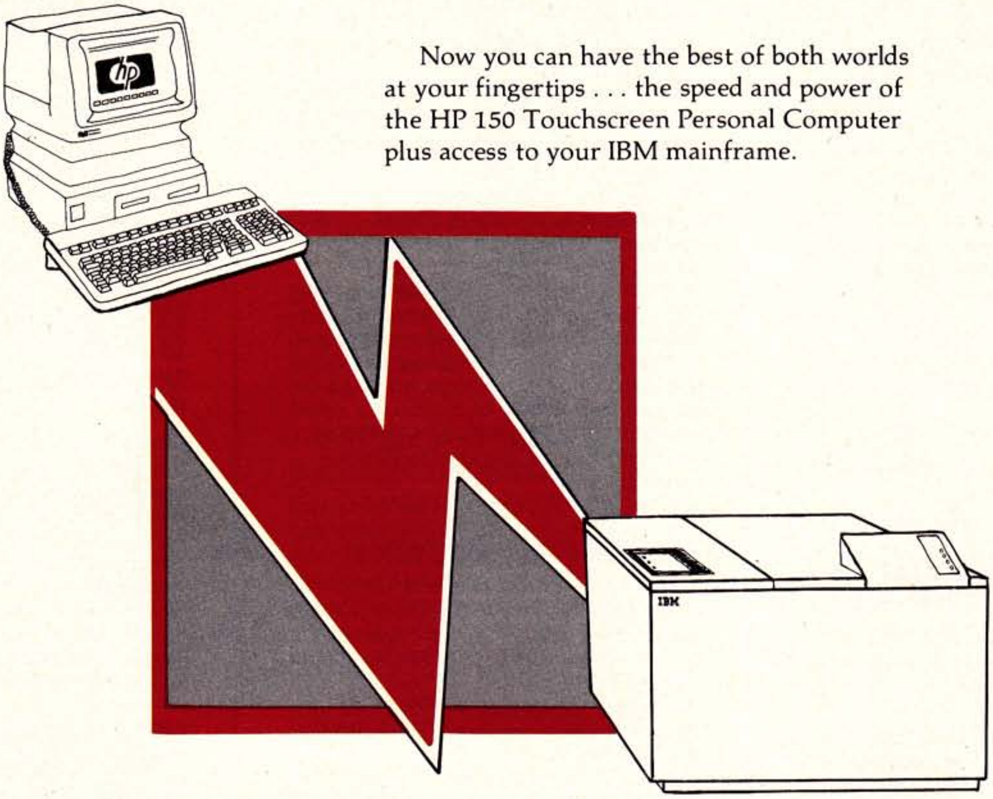
"We expect Nomad to have upward compatibility and complete data interchangeability," says Ulery. The HP product marketing manager also disclosed that The Portable will have a built-in modem as well as standard help functions.

Meanwhile, it appears that The Portable is not quite ready for public use. "Memomaker files made on Nomad are not the same as its 150 counterparts, which could cause compatibility problems between the two machines," says one user who has already seen The Portable in action.

HP is also developing a transportable—code-named Pisces—to complement the 150 and The Portable. Such a machine would presumably contain more processing power than The Portable and would be strictly AC-powered.

With the touch of a finger, the best are now talking!

Now you can have the best of both worlds at your fingertips . . . the speed and power of the HP 150 Touchscreen Personal Computer plus access to your IBM mainframe.



Just a touch and you're on your way!

The HP 150 Emulation Accessory allows your HP Touchscreen Personal Computer to tie directly into the software and data bases on your IBM systems. In addition to IBM software compatibility you can take advantage of a full range of HP 150 Personal Software Packages. And while the accessory card maintains your IBM connection, you can switch between the two applications with just a touch! No complicated commands to learn!

Big benefits in a small package!

Imagine being able to access your IBM mainframe in a package with a footprint the size of your in-basket. With the HP 150 Emulation Accessory you get an accessory card, emulation software, a user's guide and keyboard overlays . . . and your benefits are three-fold:

- Personal computing power plus IBM 3278-2 terminal emulation — no need for more terminals . . . it's all in one package.
- On-line access to IBM data bases and software — for timely data.
- Mainframe access at your convenience — no waiting for an available terminal.

HP ADVANCE NET

The networking touch . . .

The HP 150 Emulation Accessory is part of a full line of data communications products called HP AdvanceNet . . . a one-vendor networking solution to get the job done. Call your local HP dealer or sales representative for more information on the HP 150 and its 3278 Emulation Accessory. Link the best and start them talking today!

HEWLETT
PACKARD

4802404

INFORMATIO

FUNDAMENTALS HANDBOOK OF ELECTRICAL COMPUTER ENGINEERING, Vols. I, II, and III

Edited by Sheldon S.L. Chang, *State University of New York at Stony Brook*

Fully reflecting the technological shifts from analog to digital systems and from discrete components to integrated circuits, this authoritative reference work provides ready access to information on all aspects of design, fabrication, and manufacture, as well as fundamental principles.

Vol. I: Circuits, Fields and Electronics
707 pp. (1-86215-0) 1982 $69.95

Vol. II: Communications, Control, Devices and Systems
737 pp. (1-86213-4) 1982 $69.95

Vol. III: Computer Software Hardware, Software and Applications
848 pp. (1-86214-2) 1983 $66.50

STRATEGIC PLANNING SYSTEMS ANALYSIS, AND DATABASE DESIGN
The Continuous Flow Approach

Mark L. Gillenson and Robert Goldberg, *both of IBM Systems Research Institute*

The first book to integrate strategic planning, systems analysis and data base design into one cohesive, unified framework. For DP professionals who must communicate with top management and for executives or managers who must interface with DP personnel, this is an indispensable roadmap through the workings, approaches, and terminology of the other's discipline.
228 pp. (1-89066-9) 1983 $29.95

PRINCIPLES OF PRODUCTIVE SOFTWARE MANAGEMENT

Michael W. Evans, *Integrated Computer Engineering,* Pamela Piazza, *Mellonic, a division of Litton Industries and* James B. Dolkas, *Western Development Laboratories, Ford Aerospace and Communication Corporation*

Whether you're managing a small, medium or large scale project, this innovative guide shows you how to increase software production and improve system performance through a total development methodology that integrates software management and control techniques. This valuable working tool demonstrates how to monitor and control each phase of a project's development and how to anticipate and solve problems that are "generic" to software development.
240 pp. (1-89796-5) 1983 $32.50

THE UNIX OPERATING SYSTEM

Kaare Christian, *Rockefeller University*

A readable, step-by-step introduction to the features and uses of the UNIX operating system—the widely used operating system first developed at Bell Labs. Includes an abridged UNIX manual, with citations for forty of the most commonly used UNIX commands.

318 pp. (1-87542-2) 1983 $26.95 Cloth
(1-89052-9) $20.50 Paper

COMPUTER IMAGE GENERATION

Bruce J. Schachter, *Westinghouse Electric Company*

The first, detailed introduction to computer image generation. It provides descriptions of the algorithms and architectures used in all major devices and discusses current applications, including visual flight simulation for pilot training.
236 pp. (1-87287-3) 1983 $29.95

MICROCHIP TECHNOLOGY
The Past and the Future

C.C. Kerridge

A simplified guide to the components of the silicon microchip, covering transistors, amplifiers, microchip fabrication, and more. Describes the important Motorola 68000 microprocessor. Includes over 70 line illustrations and a Dictionary of Microchip Terminology.
190 pp. (1-90240-3) 1983 $16.95

DATA DICTIONARY/DIRECTORY SYSTEMS
Administration, Implementation, and Usage

Belkis W. Leong-Hong &
Bernard K. Plagman

The first guide to data systems design, implementation, and control using Data Dictionary/Directory Systems—one of today's most powerful tools for managing an organization's information resources. Here are the underlying theoretical concepts of DD/DS design, plus guidelines for evaluating and selecting a DD/DS package.
328 pp. (1-05164-0) 1982 $33.95

CRITICAL ISSUES IN SOFTWARE
A Guide to Software Economics, Strategy, and Profitability

Werner L. Frank

Werner Frank's bimonthly *Computerworld* column, "Softline", has established him as one of the most influential thinkers in computing today. This book collects Frank's most insightful work on computing's most critical issue: Software—its forms, its impact, its management. Cutting through the jargon, myths, and misconceptions, Frank brings software's technical and economic issues into clear focus for data processing managers, users, suppliers—anyone who wants to understand the main currents and emerging trends in software for the '80s.
260 pp. (1-87293-8) $26.50

CALL TOLL FREE:

VISA, MasterCard, American Express
accepted on phone orders.
Or write to L. Sullivan, Dept. 4-1850
John Wiley & Sons, Inc.
605 Third Avenue, New York, N.Y. 10158

(1) 800-5

N HOTLINE

THE DESIGN OF OPERATING SYSTEMS FOR SMALL COMPUTER SYSTEMS

Stephen Kaisler

The most detailed guide available to current techniques, procedures, and shortcuts for mini- and micro-computer operating system design. A "layered" approach simplifies OS design decisions on supporting modules, functions, and structures that lie below the user interface. You get exhaustive, step-by-step descriptions of essential components and supporting data bases and code modules, as well as guidance for writing up to 99% of an OS in high-level language—with no loss of function and with increased comprehensibility.
696 pp. (1-07774-7) $34.95

INTRODUCTION TO COMPUTER ARCHITECTURE AND ORGANIZATION

Harold Lorin

For analysts, programmers, and anyone evaluating computer products and devices, this complete non-mathematical introduction to computer organization and design is an invaluable guide. Here, in a compact, easy-to-understand source, are all the language and machine concepts needed to specify a computer: virtual memory, architeture "power", and memory organization, modern design techniques and issues, constraints and trade-offs, and basic and advanced architectures.
312 pp. (1-86679-2) $26.95

PROGRAMMER PRODUCTIVITY
Myths, Methods, and Murphology
A Guide for Managers, Analysts, and Programmers

Lowell Jay Arthur

A total approach to software development—methodology, technical tools, people, and managment—that can produce a *measurable* increase in productivity of from 50 to 100%, *and* dramatically improve the quality of your systems. You'll learn how to apply the techniques of "superprogrammers"—techniques that account for a tenfold edge in productivity over average programmers . . . plus methods for measuring program and documentation quality, reliability, and maintenability.
288 pp. (1-86434-X) $24.95

CRYPTOGRAPHY
A New Dimension in Computer Data Security
A Guide for the Design and Implementation of Secure Systems

Carl H. Meyer & Stephen M. Matyas

Two pioneers in cryptography show you how to put this powerful tool to work protecting sensitive data in any digital communications network or DP system. Carl Meyer, co-designer of the benchmark Data Encryption Standard, and Stephen Matyas offer a state-of-the-art view of cryptographic concepts and algorithms, trade-offs and implementation considerations.
755 pp. (1-04892-5) $47.95

THE STUDY OF INFORMATION
Interdisciplinary Messages

Edited by Fritz Machlup & Una Mansfield, *Princeton University;* With a foreword by George A. Miller

Edited by the late Dr. Fritz Machlup, internationally recognized Princeton economist and teacher, this interdisciplinary volume presents the most significant thinking on current areas of inquiry in the information sciences. The field's preeminent authorities contribute pioneering articles in such areas as informatics, artificial intellignece, and system theory and information science.
743 pp. (1-88717-X) 1983 $39.95

DIGITAL DOCUMENT PROCESSING

H.S. Hou, *Xerox Corporation*

The only comprehensive survey of digital document processing techniques. Integrates the fields of digital image processing, pattern recognition, information processing, digital typography, and image analysis.
336 pp. (1-86247-9) 1983 $37.50

SOFTWARE ENGINEERING
Methods and Techniques

Edited by J. Blank & M.J. Krijger

A survey of the current methods and techniques for evaluating information sytems. This indispensable guide shows project managers, EDP managers, information analysts, programmers and database administrators how to select the best method for a particuar project, implement it effectively, and avoid problems that may occur when applying it.
241 pp. (1-88503-7) 1983 $24.95

DIGITAL SYSTEMS WITH ALGORITHM IMPLEMENTATION

M. Davio, J.P. Deschamps, A. Thayse, *Phillips Research Laboratory, Belgium*

A synthesis of the main theoretical and technical aspects of the evolution of digital and switching circuits. The authors show how the classical theory of Boolean functions may be applied to the modern design of digital circuits.
504 pp. (1-10413-2) 1983 $54.95 Cloth
(1-10414-0) $31.95 Paper

DICTIONARY OF COMPUTING
Data Communications, Hardware and Software Basics, Digital Electronics

Edited by Frank J. Galland, *Datology Press, Ltd., England*

Produced with the assistance of major hardware and software manufacturers and suppliers, this profusely illustrated reference provides clear, understandable, and current definitions for the terms of modern computing.
330 pp. (1-10468-X) 1982 $34.95 Cloth
(1-10469-8) $19.95 Paper

John Wiley & Sons, Inc.
605 Third Avenue
New York, N.Y. 10158

In Canada: 22 Worcester Road,
Rexdale, Ontario, M9W 1L1

Prices subject to change and higher in Canada

26-5368

4-1850

The 71B is a brand new machine with computing power far beyond most microcomputers and scientific calculators found on the market today.

HP 71B: A FISTFUL OF POWER

BY PHIL KOOPMAN

At first blush, Hewlett-Packard's pocket-size HP 71B looks like a cross between the HP Series 41 calculators and a stripped down HP 75 portable.

It's not. The 71B is a brand new machine with computing capability far beyond most microcomputers and scientific calculators. And for the first time with a small computer, HP has made available the Internal Design Specifications (IDS) with source code and schematics.

While one can't actually call the 71B a pocket IBM 370, it's close. Aptly code-named Titan, this battery-powered device addresses up to half a megabyte of memory. Maximum on-board memory is 320K bytes—via four plug-in ROM and RAM memory modules—including the internal 64K ROM and 17.5K RAM memory. The 71B works as an immediate-mode calculator or as a computer. The base unit, complete with HP's Extended BASIC, the operating system (OS) in 64K of ROM and 17.5K of RAM, sells for under $550.

The 71B signals a major change in direction for HP in the design of its small computers and calculators. Sal D'Auria, product manager at HP, calls it "the bridge between programmable calculators and computers." In addition to making the 71B an "open" machine, HP abandoned the well-known postfix notation used in its scientific calculators in favor of a sophisticated algebraic calculator mode. The calculating engine is also all new. Rather than the multichip 16-bit processors used in computers like the HP 86, the go power for the 71B is a new 4-bit CMOS microprocessor.

Backing HP's push for third-party support is a complete software-development system that comes in two versions. Adding the optional HP-75-style strip-card reader and HP-IL interface allows up- and down-loading of programs to most personal computers via the software-based HP 71 Development Utility. Tacking on the development ROM allows software development in BASIC, FORTH and assembly language. Within this environment the 71B becomes a slave to the development micro—the display and keyboard are transferred to the host computer. If the host machine doesn't have an HP-IL interface, an RS-232-C adapter hooks the HP-IL loop to most popular micros such as the IBM PC or even the low-cost Atari.

HIGH-POWERED CALCULATIONS

Like numerous pocket computers such as those from Sharp and Radio Shack, the 71B can be used for straightforward programming in BASIC—but with a vast difference. Its on-board BASIC in ROM, with over 240 commands, is geared for scientific, engineering and statistical calculations. Unlike most other ROM-based BASICs, the 71B's BASIC can be extended for special applications. These extensions can be either soft, via data loaded from the card reader into ROM, or added with ROM the way HP extends BASIC with keywords that control the HP-IL interface loop.

HP's BASIC for the 71B is an extended version of the ANSI minimal-BASIC standard. In addition to offering statistical functions, HP tacked on the expected trigonometric functions and unexpectedly built-in floating-point math conforming to the unfinalized IEEE standard. Most microcomputers that have IEEE-style floating-point math use a special co-processor chip, like Intel's 8087, used with 8086/88 microprocessor-based IBM-PC type computers. And the cost of a co-processor chip alone for these math functions is about half the price of the 71B.

Coupled with ROM-based applications packages such as HP's Math Pac, the 71B becomes a high-powered computer that cranks out calculations rivaling those that can be done on most general-purpose computers, including minis and even some of the small mainframes.

PHOTO © DAVID ARKY 1984

HEWLETT PACKARD
71B

The owner's manual follows the step-by-step approach so that beginners and experts rapidly become familiar with the operation of the 71B.

Plugging in Math Pac lets the 71B operate on complex variables and arrays, advanced real- and complex-valued functions and real and complex arrays, and solve systems of equations. Adding to the operations provided by Math Pac gives the ability to solve the roots of polynomial equations and user-defined functions, and perform numerical integration and do finite Fourier transforms. And many of these functions, incorporated into the 71B as BASIC keywords—binary-base logarithmic functions, for example—can be used in the one-shot immediate-calculation mode.

THE HEART OF THE 71B

The 71B is built around a 4-bit CPU running at 465 kHz optimized for fast processing of binary-coded decimal (BCD) data. The data path is only 4-bits wide—most microcomputers use at least 8-bit data paths—making it a "nibble" (4-bit) processor. Internally, the nibble-oriented memory is addressed with a 20-bit program counter. This 20-bit address can handle up to half a megabyte of memory.

To yield the high accuracy needed for scientific calculations, the 71B has a bevy of large-capacity registers. There are four 64-bit work registers, five 64-bit scratch registers, a pair of 20-bit data-pointer registers, a 16-bit input register and one with 12 bits used for data output. Matching the 20-bit program counter is the return-address stack, eight levels deep, also with a 20-bit capacity. Rounding out the hardware are the status registers. There are four hardware status bits, a carry bit and 16 program-status bits, or flags. The lower 12 flags of the status register can also be used as a 12-bit data register.

The low power consumption of these CMOS chips and associated RAM and ROM modules allows extended operation on dry batteries. Also incorporated into the 71B is a power-down "sleep" mode that retains all data currently in memory. A program command, manual operation of the off key or a 10-minute time-out puts the 71B into the sleep mode so that it uses only a trickle of energy. The unit also runs off a 120V AC source with an optional power adapter.

An integral part of the 71B, like its big brother the HP 75, is a clock and calendar. It operates continuously, even in the sleep mode. Accessible with BASIC commands, the clock/calendar allows applications programs to work with real-time data—for example, tagging a data input with the time and date of entry.

The LCD single-line display is a dot (pixel) matrix with 8 by 132 elements. It provides a 22-character window on the contents of the 96-character input buffer. Control keys allow jumping to either end of the line or scrolling across the line. The display's scroll rate, contrast and viewing angle are all programmable. For graphics or redefinition of the character set, the display can be addressed on a pixel-by-pixel basis. Data can also be read directly from the display into a program. This gives display operation like that of a memory-mapped CRT display used with most microcomputers.

The keyboard has a modified calculator-style qwerty layout plus a 16-key numeric keypad. With the exception of the two control keys, the default key definitions yield three functions for each key. Typing aids, accessed by shifting the regular keys, allow entry of the more commonly used BASIC keywords with a single keystroke. Editing, scrolling (both up and down as well as horizontal scrolling of the 22-character display window) and upper- and lower-case character control are also part of the basic keyboard.

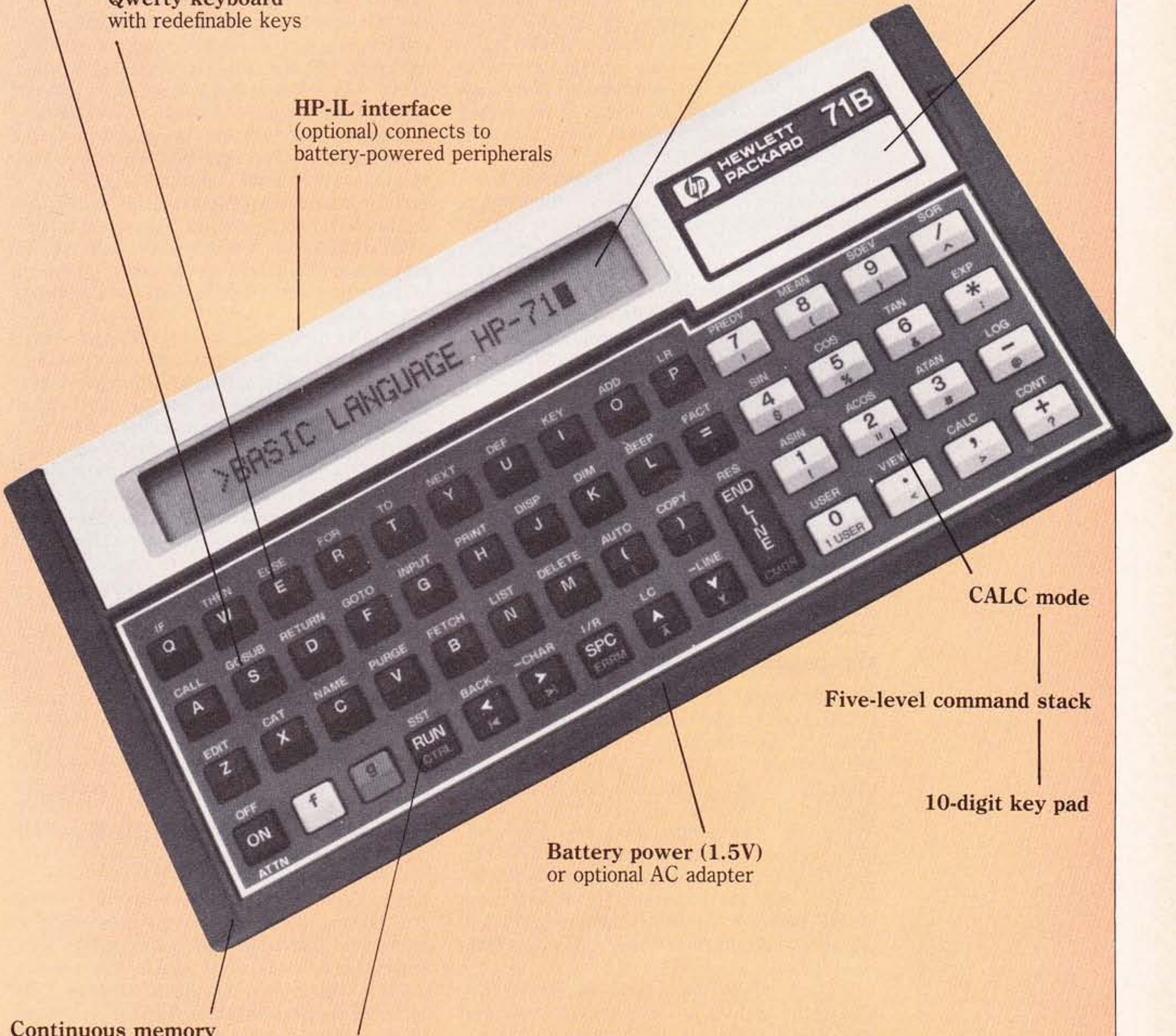
The 12-ounce works of the 71B come wrapped in a plastic case measuring 3⅞ by 7½ by 1 inch. Accessory hatches allow the addition of four ROM/RAM packs, a manual-pull strip-card reader and an HP-IL interface for communication with the outside world. All add-on options and the four AAA battery cells fit within the case.

A NOT-SO-BASIC BASIC

Adding to the flexibility of the 71B's BASIC is the ability to "call" subprograms as done in FORTRAN. This permits the development of a library of often-used subprograms or entire programs that can be loaded into memory for access by other programs. Unlike most implementations of BASIC, the 71B permits multiple programs and subprograms to be in memory at the same time. These programs can be chained, the way most BASICs permit, or use the FORTRAN-style call of subprograms.

The subprogram concept gives enormous flexibility to the programmer. It enables parameters to be passed between the executing program and the subprogram and the reverse. Also permitted is the use of a complete BASIC program as a subprogram call. Once executed, a BASIC program such as a keyboard-definition routine, returns control to the calling program. A forced reload of the caller, required if the CHAIN command were used, isn't needed.

When a subprogram call is executed, the



Programming in BASIC

Card reader
(optional) accommodates magnetic cards for mass storage and program loading

LCD
with 22-character window

Qwerty keyboard
with redefinable keys

HP-IL interface
(optional) connects to battery-powered peripherals

CALC mode

Five-level command stack

10-digit key pad

Battery power (1.5V)
or optional AC adapter

Continuous memory
retains data with power off

Four ports
for application software or additional memory modules

In the reference manual, all keywords are defined, flow-charted and explained with examples—a badly needed format for advanced programmers.

OS first checks the current program executing. If the call is not found within that program, a search is made of all other program files in memory. Failing that, a check for the subprogram is then made of each of the plug-in ROM modules. If the subprogram call is not found, and passes no parameters, then the OS checks for a program file with the specified name of the subprogram. To avoid conflicts between programs, the OS creates two operating environments—one for the executing program, one for the subprogram. New variables that do not disturb those of the calling program are created unless these variables are passed as parameters.

The 71B also provides for recursive programming—a process where a subprogram calls itself. In the same way a main or subprogram calls another, the OS creates a separate environment for the recursive call of the same subprogram. Typically, recursive calls are used for advanced calculations such as Fibonacci series. A single subprogram containing the calculation algorithim calculates a value, passes the data to itself and does the next calculation.

Recursive programming is also useful for non-math programming. A good example is a recursive on-line help routine. Entering the word HELP or pressing a HELP key calls a subprogram that displays the basic commands for that part of a program. If the user needs more detail, HELP should be entered again while still in the HELP subprogram. This recursive call gives greater detail, such as how to use specific editor commands.

KEYBOARD REDEFINITION

Another rarely found feature of the 71B's BASIC is the ability to use either labels or line numbers. Specific numbered program lines can be labeled—other parts of the program using the routine simply tack the label rather than the line number onto a GOTO or GOSUB statement. The programmer also has complete control over the keyboard and the display. Topping off the flexibility of HP's BASIC for the 71B are additional extensions such as the ability to redefine the keyboard and display and do language translation of program messages.

User redefinition of the 71B's keyboard is a powerful feature for both programming and applications software. All keys, with the exception of the shift keys, can be redefined. These definitions do not disturb the standard keyboard functions since the keyboard can be switched back and forth between the standard definitions and user definitions. Also, the new definitions can be intermingled with those of the regular keyboard since redefinition is on a key-by-key basis for the unshifted keys and the two types of shifted keys. For example, the lower-case character set can be redefined as additional BASIC keywords. This switching can be done manually via the keyboard or under program control.

The keys can be redefined either by key-code number or by the key or key-combination markings. FC, for example, is the combination of the *f* shift key and the letter C key. Two types of control over the new definitions are provided. The entire keyboard can be switched to the new definitions and left that way or switched for one-time use. Press a redefined key, the redefinition executes and the keyboard returns to its normal set of definitions. Additional BASIC commands let the programmer view and edit the new definitions.

The keyboard can be redefined in three ways:

1. By adding typing aids, like those built into the machine for single-stroke entry of BASIC keywords. This is a boon for programming, particularly if you take advantage of the label capability of BASIC or are working in FORTH.

2. For use in the immediate-execution mode. Pressing the redefined key adds the new definition to the end of whatever command sequence is in the display buffer. The computer then executes the entire line.

3. For direct execution of a complex command sequence, like loading and running a specific program. This data is executed without being displayed. One use for direct-execution definitions is as a user response to a program's input request. When you press the key, the command sequence is displayed and executed.

User redefinition of the keyboard is a powerful feature for both programming and applications software.

Adding to the keyboard's flexibility are commands that scan and control keystroke entry. These commands enable the user to confirm that a key has been depressed or determine which key was activated. A third command lets a program "press" a key. For example, a program might enter the screen-clear key (ATTN) during operation. When the program ends, the ATTN-key command is executed, clearing the display.

The programmer is also given complete

control over the display and 256-character set. Codes for characters 0 through 127 are preset and are also the default characters for 128 through 255. However, 128 through 255 can be redefined provided that each character's dot pattern on the display can be contained in a pattern six dots wide by eight dots high.

The display window is also under program control. Parts of the display, like a text message to enter a number, can be protected. This prevents the user of an application from backing up the cursor and entering part of the message as a program-input response—a common feature on terminals for data entry but not usually available on microcomputers.

Display and print-control extensions to HP's BASIC are also part of the base 71B by providing commands for print-formatting a string, like IMAGE and PRINT USING, as HP does in its larger computers. The display- and print-line width are also programmable. Adding to this is the ability to control the cursor and change the end-of-line character.

Rounding out the memory-mapped style of the 71B's display is graphics control. Characters can be read directly from the display by a program. Similarly, individual columns of dots can be read and input to a program. Conversely, the dot patterns can be replaced on the display in any position—again a feature normally found as the GET and PUT functions for a memory-mapped microcomputer's video display.

LOCK AND LOAD

Two other commands available on the machine are also unusual for a pocket computer. A user can "lock" the computer with a password. The lock can be activated even with a program running, preventing unauthorized access to program data, at the same time allowing an applications program to be run. Once activated, the 71B requests the password when turned on. If the password's not correct, the machine turns itself off. Without the password, the only way the lock function can be bypassed is to clear all memory. With no program or data in memory, there is nothing left to protect.

A final touch is added with the startup command. When the 71B is turned on, it executes a predefined command sequence, such as loading and running a specific program. This command functions in much the same way as a command file for some of the more advanced microcomputer operating systems that provide mainframe-style features.

If one delves deep into the extensive IDS documentation—the shipping weight was over

SPECIFICATIONS

DIMENSIONS

19 cm (7.5 in) × 9.7 cm (3.8 in) × 2.5 cm (1 in)

WEIGHT

340 g (12 oz) with batteries

POWER

Batteries	four 1.5V, AAA batteries (replaceable by user)
Battery current	.03 mA (off) .75 mA (idle) 10 mA (operating)
Average alkaline battery life	60 operating hours (battery life depends on use)

OPERATING REQUIREMENTS

Operating temperature	0° to 45°C (32° to 113°F)
Storage temperature	−40° to 55°C (−40° to 131°F)
Humidity	0% to 95% relative humidity

DISPLAY

Capacity	8 × 132 dot matrix; 22 characters, each 5 × 8 matrix, scroll to view 96-character buffer; 14 annunciators.

CHARACTER RANGE

A-Z, a-z, 0-9, plus 65 special characters.

NUMBER RANGE

$-9.99999999999E-499$ to $+9.99999999999E+499$, plus zero. Numbers are shown with a maximum of 12 digits, or a 14-digit mantissa and a three-digit exponent. Calculations to 12-digit accuracy.

MEMORY CAPACITY

Built in: 17.5K bytes

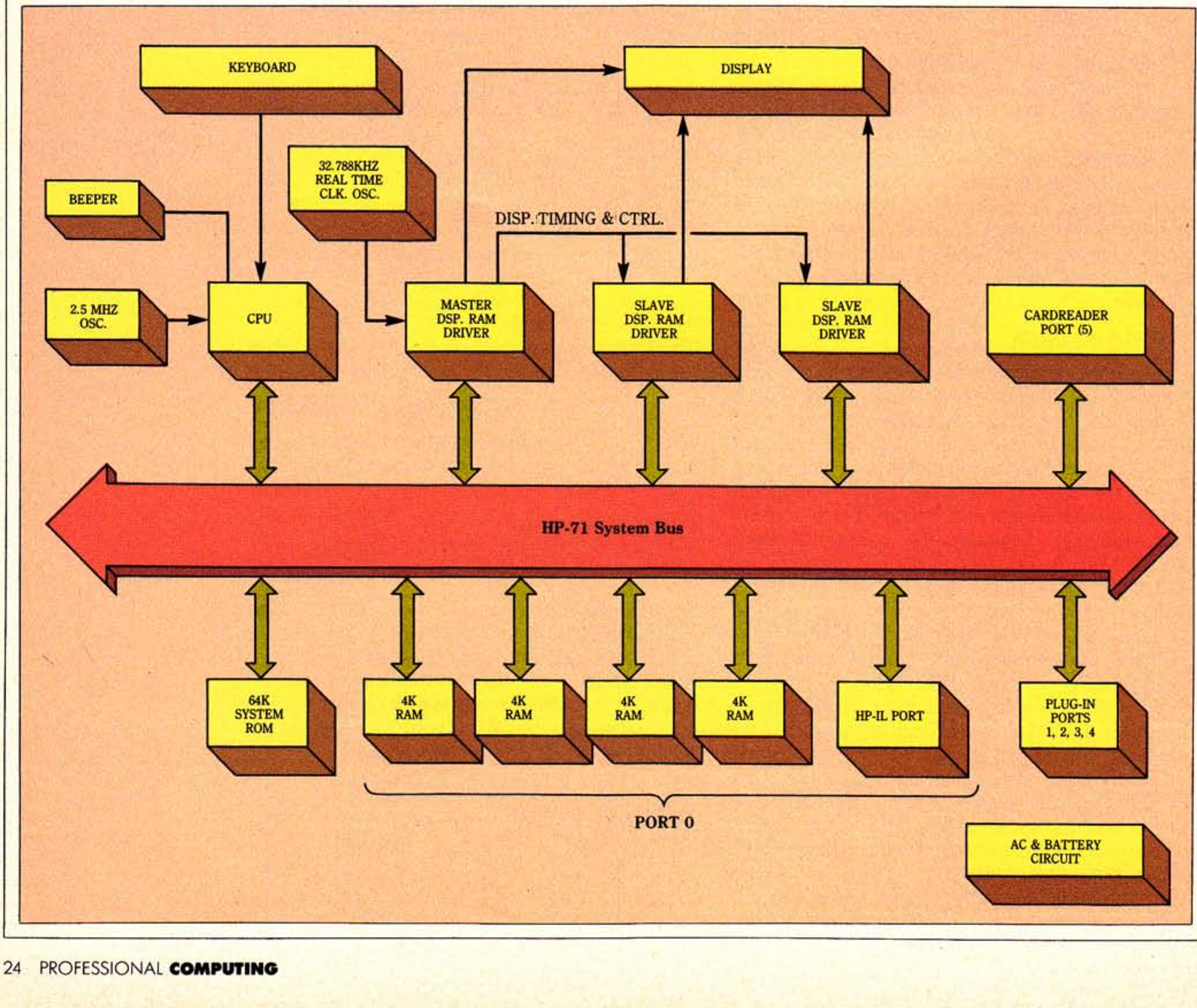
Maximum extended memory: 33.5K bytes (with four 4K-byte memory modules)

30 pounds—many details of special functions are revealed. One of these is the ability to use a foreign language as program inputs without rewriting the program. The same applies to the computer's error messages.

This ability is an example of soft extensions to HP's BASIC and the firm's commitment to the international market. Available from the HP User's Library as LEX File 82, the BASIC extension adds the keyword MSG$. Its operation is similar to that of the regular error-message command, ERRM$. Where the error-message function returns the last error or warning message to a program, the message-string function returns a message from a predefined message table rather than from text within the applications program itself. When you change the message table in memory, the language of the program changes.

This message-table concept allows a program to be used in any language—translation of input and output are automatic. As an example, the 71B's text editor stores all of its commands, program responses and a help facility in a message table. User inputs are compared to the message table with the MSG$ functions. This language-translation function drives the text editor in any language. Program changes aren't needed—just a new message table in the desired language.

The scheme also allows multiple message tables to be part of an applications program. Message-table selection is controlled via a keyword in the controlling translator. These tables are ROMable, making it possible to supply a specific language, like Spanish, in ROM, or to include multiple languages within the same applications program in ROM as


HP 71B **system block diagram**
KEYBOARD
DISPLAY
32.788KHZ REAL TIME CLK. OSC.
BEEPER
DISP. TIMING & CTRL.
2.5 MHZ OSC.
CPU
MASTER DSP. RAM DRIVER
SLAVE DSP. RAM DRIVER
SLAVE DSP. RAM DRIVER
CARDREADER PORT (5)
HP-71 System Bus
64K SYSTEM ROM
4K RAM
4K RAM
4K RAM
4K RAM
HP-IL PORT
PLUG-IN PORTS 1, 2, 3, 4
PORT 0
AC & BATTERY CIRCUIT

Adding to the flexibility of the 71B's BASIC is the ability to "call" subprograms as in FORTRAN, easing the burden of the programmer.

HP does with the 71B's text editor.

THE OPERATING SYSTEM

While the hardware of a computer is important, what makes up a complete computer is the meld of the operating system (OS) software and hardware. This determines the true architecture of the computer and controls its capabilities. As in most modern microcomputers, the core of the 71B's operating system is in ROM. Extensions to the system, such as external file handling on mass-storage devices via the HP-IL interface, are added to the OS core with additional ROM. These additions can also be in software and loaded into the system from magnetic cards or from a mass-storage device such as a tape drive.

The core, or kernel, of the 71B's OS performs control functions. The kernel and the BASIC interpreter reside in the internal 64K ROM that is part of the basic machine. The OS processes up to four different file types. It interprets or processes BASIC, binary machine code (BIN), language extension (LEX) and FORTH files. BASIC files are developed and translated with the standard system. Developing BIN, LEX and FORTH files requires the FORTH/Assembler ROM. Executing FORTH files also requires the FORTH/Assembler ROM.

The BASIC files are stored in token form. The English-like BASIC words are translated into space-saving tokens to reduce the amount of memory needed and to speed up program execution. BASIC or BIN program files can be executed as a program or a subprogram.

The LEX files add extensions to BASIC and also the message-table capability. When a LEX file is added to the machine, the OS registers its presence. This tacks on the added commands to BASIC, making the extensions an integral part of the interpreter.

A key part of the OS is the presence of software "hooks," called "polls" by HP. These polls let a LEX file intercept machine operation at key points and then modify how the machine works. There are over 80 points in the OS operation—at the end of parsing a line of BASIC code, for example—where all LEX files are checked for an intercept and revectoring of the computer's operation to a different or special operation. Conversely, LEX or BIN files can access routines such as a BCD math calculation or file-handler within the OS. Effectively, these entry points use parts of the OS as efficient, debugged machine-code subroutines. HP guarantees that these entry points into the OS, as documented, will be maintained in future releases of the OS. If the user prefers, the entire OS can be switched out and replaced with a custom operating system.

Also part of the OS is the basic file-handling structure. The 71B uses a memory-based file system that handles files in serial form within the memory—no central file directory, common with disk-based systems, is used. In effect, programs in memory are one large file, with the splits between the programs identified with that program's name.

The 71B treats the files within a ROM module in a similar manner. Each ROM module contains its own file chain in the same format as those in regular memory. With a RAM module there are two options. The files, still in the chain format, can be maintained as a separate environment or can be merged and become part of the main file chain. This pooling of files is an automatic operation of the OS.

File partitioning in RAM or ROM allows flexibility in program design. All of the system's five memory ports can be controlled by a program or by the user. RAM modules, including the internal 16K RAM, can be partitioned in 4K increments for use as either system RAM or independent RAM. All RAM, with the exception of the internal system RAM tagged as Port 0, can be extended. Ports with RAM or ROM can be cut into or removed from the system's software. By specifying a particular port or a partitioned section of a port, a program can more quickly locate data. It also allows a user to remove a memory module without disturbing data in the remainder of the system RAM.

The 71B signals a major change in direction for HP . . . It's the bridge between programmable calculators and computers.

In addition to the tokenized BASIC program code, the OS handles data files. These data files can be sequential or random-access. Full control of data access is provided, including resetting of the random-access file pointers.

There are three types of files: regular data files that contain numeric values or strings of characters, text files formatted so they can be read by other computers such as the HP Series 80, and a special data file, SDATA, that has the same format as data files created by the HP Series 41 programmable calculators.

HP made the 71B an "open" machine and abandoned the well-known postfix notation in favor of a sophisticated algebraic calculator mode.

The text files can also be accessed sequentially or randomly; however, data can only be stored in a text file sequentially. Data files can also be used for array storage. This data is stored linearly, allowing data access with or without the array format. These data-file arrays can be one- or two-dimensional.

ALL THOSE TINY KEYS

The 71B's keyboard has keys like those of the HP Series 41. Even though the alphabetical keys are closely spaced, it's quite easy to type in text, and typing allows single-keystroke entry of the more common BASIC keywords.

However, when you switch between regular typed inputs and then use a shift key to access either a keyword input or a character like the heavily used quote mark, there's a break in the input sequence. Since the keywords and special characters aren't in a typewriter-style format, you have to search for them, which almost forces you to take your fingers off the keyboard. It's like going from touch typing to hunt-and-peck.

With the tremendous program capacity of the 71B, the small keyboard makes entering large programs a slow and tedious process. Except for learning the system's operation and entering small programs, the small keyboard becomes a limiting factor for programming. For use with ready-to-run programs like Math Pac, the small keyboard presents no problem, just as thousands of users of the Series 41 have little difficulty. Fortunately, designers recognized the difficulty of extensive program development with the 71B's small keyboard and corrected it with a utility program.

GOOD FEATURES

1. Small size
   Portability
   Battery operation
2. Multiple languages: BASIC, FORTH, assembly language.
3. Complete software and technical information available, including source code and schematics.
4. Total on-board memory capability of 320K bytes allows large-scale program operation, including complex mathematical calculations.
5. Development systems make large-scale programming feasible by third parties.

BAD FEATURES

1. Keyboard: Keywords and special characters aren't found on the key with the corresponding initial letter—THEN, GOSUB and PRINT, for example, are on W, S and H. This slows down data entry by forcing a change from touch typing to hunt and peck.

THE BASIC DEVELOPMENT UTILITY

According to HP, the design guideline for the 75 was to make the machine as small as possible and still maintain touch-typing ability. This guideline was obviously impossible for the pocket-sized 71B. To solve the problem, HP came up with a utility program. BASIC programs are written as text files on micros such as the HP 86 or IBM PC. This data is then down-loaded to the 71B via the HP-IL data link. The 71 Development Utility controls either up- or down-loading of BASIC programs in a text-file format. The program comes on magnetic cards, so the 71B must be expanded to include a card reader. And the HP-IL interface also has to be added.

However, the internal works of the 71B, as in most HP micros, operates with tokenized BASIC rather than BASIC source code in an ASCII-text format. The 71 Development Utility also contains a TRANSFORM function. This function changes the received ASCII-text BASIC source code into the tokenized form used by the 71B. It reverses the process so that the 71B's programs can be up-loaded to the host development computer in the ASCII-text format.

The 71 Development Utility manual shows how to use the software with different interfaces to the HP 86/87, including HP-IB and HP-IL, and how to run it with non-HP computers, too. Source code, written in Microsoft BASIC, is given for using the IBM PC as the host computer. This code, with possible minor changes, is easily transported to other micros, like the Atari or Commodore machines, since most versions of Microsoft BASIC are similar. However, since direct connection of the HP-IL isn't possible with most non-HP machines, an HP-IL to RS-232-C convertor will be needed. And the host computer will, of course, require an RS-232-C interface.

ADVANCED SOFTWARE DEVELOPMENT

Taking the BASIC Development Utility one step further, HP's engineers and software team also provided for large-scale program development. Adding the FORTH/Assembler ROM to the 71B lets the user link the tiny machine, via the HP-IL interface, as a slave computer to a regular micro.

The FORTH/Assembler ROM contains a FORTH operating system, an assembler—the same as used to develop the 71B's OS—and a text editor. It also adds to BASIC the keyword KEYBOARD IS.

Instead of just writing code in a text-file format and then down-loading it to the 71B, adding the FORTH/Assembler ROM lets the host computer take full control. The display is transferred to the host with the DISP IS command (contained in the HP-IL ROM) and keyboard control is taken over with the KEYBOARD IS statement. This permits real-time program development and debugging on the host computer—remember, the host is still working as a dumb terminal. All operations are performed within the 71B. In fact, a computer isn't even required. A terminal alone will do.

PROGRAMMING IN FORTH

FORTH's fast operation compared with BASIC and its compact compiled form makes it attractive for writing applications programs. The FORTH operating system coexists with the 71B's BASIC operating system. This allows a program to switch between FORTH and BASIC without program or data loss. Programs written in one language can execute programs written in the other.

This ability to interchange between FORTH and BASIC also solves one problem that exists with all versions of FORTH. Without large-scale non-standard extensions, FORTH is more suitable as a control and processing language—text-string handling with FORTH is primitive. With the OS handling interlanguage processing, HP's FORTH then has full access to the BASIC interpreter's string-handling routines.

FORTH is also a screen- or block-based language in most disk-based versions. It contains the language, and most versions are also the operating system for the computer. Instead of using conventional data files, most versions of FORTH use a block of disk sectors organized in 1K-byte capacity "screens". Again, the OS-controlled interplay between BASIC and FORTH adds a new dimension to HP's version of FORTH—conventional file handling and file access. This is another feature that exists only with extensions to FORTH rather than being part of the base language. The bottom line is that HP's implementation of FORTH melds the best features of FORTH and BASIC.

The implementation of HP's FORTH differs slightly from most versions of FORTH. Most versions are for regular 8-bit microprocessors and use 16-bit addressing. HP's FORTH apes the structure of the 71B and provides for 20-bit addressing. This allows FORTH to access the entire 1 meganibble address space of the 71B. It also changes the way the FORTH stack works—numeric quantities are 20-bits, not the usual 16-bit values. While the usual FORTH primitives, like @ (pronounced fetch) are retained, their operation is in the 20-bit mode. Byte-oriented FORTH words, like C@ (character fetch) work in the same way as conventional 16-bit FORTH implementation. Since the 71B is a nibble-oriented machine, HP added nibble words. An example is N@; it places the contents of the addressed nibble on the stack the way C@ places the contents of a particular byte on the stack.

THE FORTH-BASIC INTERPLAY

The interplay between FORTH and BASIC is built around a set of keywords that pass data between the two languages. To use BASIC's floating point routines, for example, FORTH passes a string containing the numeric data to be evaluated, followed by the keyword BASICF. BASIC evaluates this data and returns the answer to the X Register in the FORTH floating-point stack.

Similarly, BASIC can access FORTH. The keyword FORTHX is a BASIC statement that returns the contents of FORTH's floating-point-stack X Register. Strings and other data can be passed between FORTH and BASIC in the same way.

The interaction between the two languages also extends to control of machine functions like the data display mode—decimal, engineering or degrees/radians. Either language can set the output mode. The FORTH word that switches output between degrees and radians also switches any calculation results from BASIC to that same mode—and vice-versa.

While this interplay is complex, it has been simplified for many of the commonly used routines like floating-point math and string handling. FORTH words like F+ (add floating-point numbers) and STR$ (convert a double number into its ASCII string) automatically control the interplay.

With a FORTH/Assembler ROM in use—it must be present to run FORTH programs—the 71B can save FORTH values and programs. Like the environments created for subprograms, all FORTH data is saved when the

Hewlett-Packard is backing its push for third-party support for the 71B with a complete software development system that comes in two versions.

user or program switches between FORTH and BASIC, and vice-versa. The RAM-based part of FORTH, including the user dictionary of added high-level FORTH definitions (words), is held in a file called FORTHRAM. This data is maintained during power down (sleep) or when switching between languages. Only purging this file destroys the user-defined parts of FORTH.

The assembler, written in FORTH, interestingly enough, provides the complete command set used to develop the 71B's OS. It can be used to create binary files, LEX files to extend BASIC or to add new machine-code primitives to FORTH.

The text editor included in the FORTH/Assembler ROM creates general-purpose text files. These files can be source code for assembly language, BASIC or high-level definitions of FORTH words or just straight text files—for any purpose.

DOCUMENTATION

The two-volume documentation (and a quick reference guide) that comes with the 71B is a pleasant surprise. In the past, HP's documentation—for the 85 and 86, for example—was designed for step-by-step learning. A nice approach for the beginner but cumbersome for an experienced programmer. In some of the manuals, the file-handling commands were scattered about in different chapters—difficult going, at best. The only place to go for help was the brief programmer's card. Or you could go into the index and dig.

In sharp contrast are the manuals for HP accessories like the I/O ROM. Here, all keywords and operations are explained with flowcharts and examples in one or two pages.

Obviously, HP has been listening to its users. The owner's manual follows the step-by-step approach so that beginners or experts can rapidly become familiar with the 71B's operation. As well as covering the base configuration of the 71B, the owner's manual shows how to install and use the optional tape reader and optional HP-IL interface.

In the reference manual, all keywords are defined, flow-charted and explained with examples. This is a useful and brief format badly needed for advanced programmers, particularly when you have been working with other languages and need to be reminded how a specific command works. The same format is also used for the 71B's HP-IL interface.

While the manual for the 71B Development Utility doesn't go into flow-charting of the commands, its step-by-step examples should make it easy for even the beginner to transfer BASIC programs in text form between a micro and the 71B. For more advanced users and those with non-HP micros, the manual details the data-format requirements and how to customize the source code for specific hardware configurations. An appendix gives the source code for the 71B and a specific program for the IBM PC.

The FORTH/Assembler manual is brief and to the point. HP assumes that anyone doing this level of programming is experienced. It doesn't lead the beginner by the hand. The assembler documentation makes heavy reference to the IDS manuals for the 71B. Within these manuals are the assembly-language details and many sample programs, such as a Spanish-language translation LEX file of the 71B's error messages.

For advanced programming, the IDS manuals are an absolute necessity. Example material is brief, descriptive and clearly written. If you're familiar with computers, the manuals are easy to use. The IDS sections include overviews of the major functions of the 71B—for example, the file system—and then breaks them down with details of particular parts, such as the operation of BASIC's parser. The source code of the modules is well commented and easy to understand if the reader is experienced with assembly language and has learned the mnemonics of the 71B's assembler.

The 71B is built around a 4-bit CPU running at 465 kHz optimized for fast processing of binary-coded data.

The IDS manuals also contain the software hooks (entry points) to each of the software modules needed to take full advantage of the 71B's unique abilities. The combination of the entry points and detail code of each module of the system, lets the user evaluate particular modules to determine if they do the job. If not, it's easy enough to create a new module—for example, adding a special-purpose BASIC keyword—by modifying and/or combining the code of one or more modules.

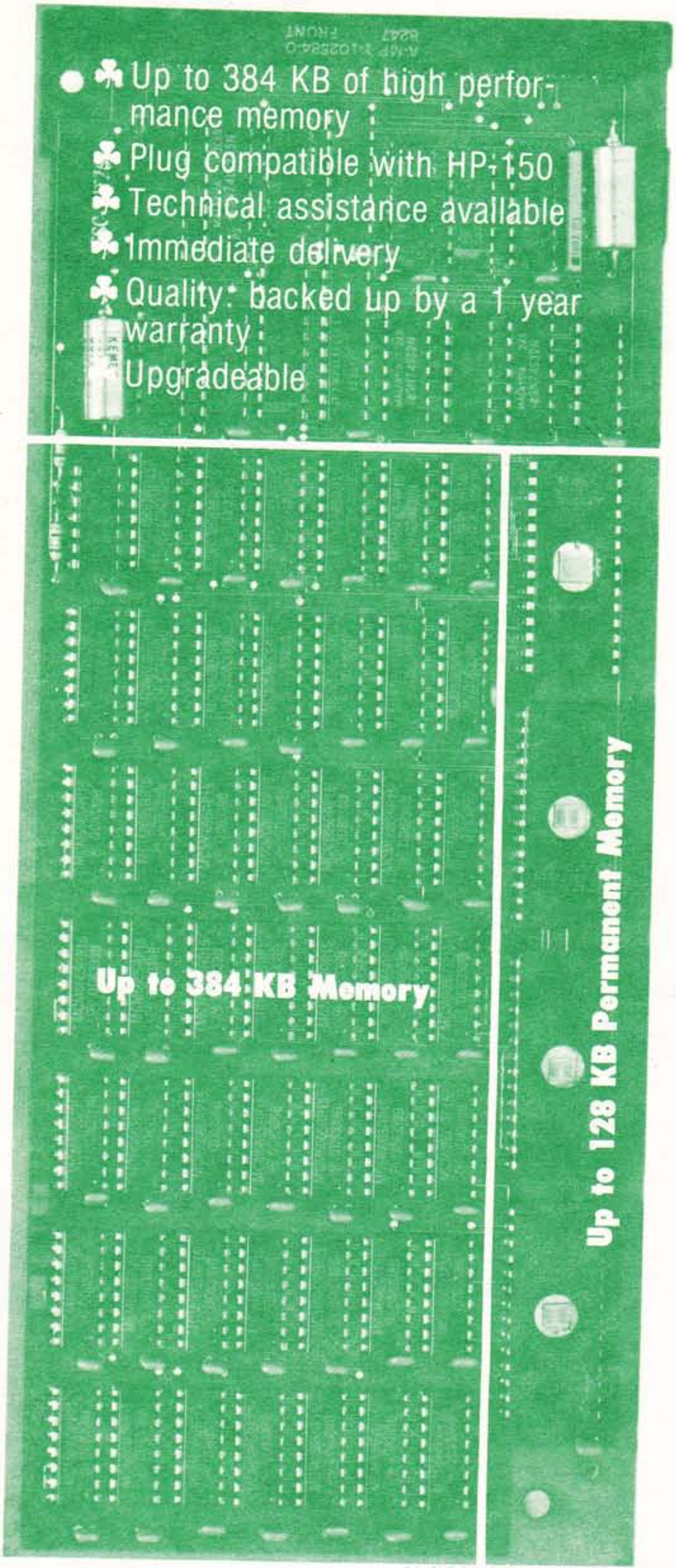
SOFTWARE SUPPORT

HP is backing the 71B with a bevy of what it calls Solution Books. It's expected that the same general topics covered for the Series 41 and the 75 will be available. The books provide source code with detailed operating instruc-

THE PERFORMANCE ACCELERATOR FOR THE HP-150!!!

RUN 1-2-3* AT ITS FULL CAPABILITY

- Up to 384 KB of high performance memory
- Plug compatible with HP-150
- Technical assistance available
- Immediate delivery
- Quality: backed up by a 1 year warranty
- Upgradeable



*1-2-3 is a registered trademark of Lotus Dev. Corp.

KELLY COMPANY

Call Larry Kelly (415) 960-0154
1544 Redwood Drive, Los Altos, CA 94022

ORDER

Yes, I want to get full performance from my HP-150. Send me

☐ PERFORMANCE ACCELERATOR with			
☐ 128 KB memory	$	610	$
☐ 256 KB memory	$	860	$
☐ 384 KB memory	$	1120	$
☐ EXTENDER BOARD	$	495	$
Sub Total			$
Sales Tax			$
Total			$

☐ Please have salesman call, my phone number is (_____) ____________

☐ Please send me more information on PERFORMANCE ACCELERATOR—II and the permanent software series.

☐ Add me to your mailing list

Method of payment

☐ Check or Money Order Enclosed ☐ C.O.D.
☐ VISA ☐ Master Card
Card #________________ Expires __/__

Name ____________ Title ____________

Company ____________________

Address ____________________

City __________ State _______ Zip _____

ORDER

Yes, I want to get full performance from my HP-150. Send me

☐ PERFORMANCE ACCELERATOR with
☐ 128 KB memory $ 610 $
☐ 256 KB memory $ 860 $
☐ 384 KB memory $ 1120 $
☐ EXTENDER BOARD $ 495 $
Sub Total $
Sales Tax $
Total $

☐ Please have salesman call, my phone number is (_____) ____________

☐ Please send me more information on PERFORMANCE ACCELERATOR—II and the permanent software series.

☐ Add me to your mailing list

Method of payment

☐ Check or Money Order Enclosed ☐ C.O.D.
☐ VISA ☐ Master Card
Card #________________ Expires __/__

Name ____________ Title ____________

Company ____________________

Address ____________________

City __________ State _______ Zip _____

THE POWERFUL SOLUTION

Power! Run 1-2-3 spreadsheets to the max. Take your HP-150's memory up to the 640 K limit. This enables you to run larger speadsheet models, create larger in-memory database, and run windowing and background tasking applications.

Performance! High performance technology provides you with fastest execution possible.

Quality! Completely designed, produced and tested by computer for quality and reliability. Backed up by a full 1 year warranty and 72 hour service.

Convenience! Installs in 5 minutes. No confusing switches to set. Fully compatible with your HP-150.

Upgradeable! Your PERFORMANCE ACCELERATOR is upgradeable to the Permanent Software Series. Your expansion board is upgradeable to accept software in permanent memory (PROM) as software products become available.

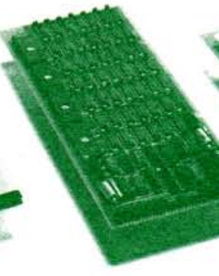
Specifications: The PERFORMANCE ACCELERATOR has from 128 KB to 384 KB of high performance memory. The PERFORMANCE ACCELERATOR II has 128 KB to 384 KB of high performance memory and up to 128 KB of permanent memory (EPROM).

Also Available: Extender Board for developers. Has test points for all address, data and control lines on the HP-150 backplane. Allows products under development to be tested and monitored outside the HP-150.

Extender Board

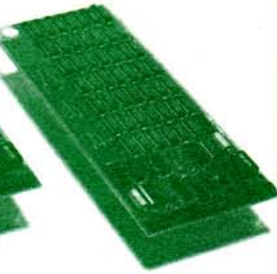
Dual Function Expansion Board

PERFORMANCE ACCELERATOR II



Memory Expansion Board

PERFORMANCE ACCELERATOR



Model	Model	Capacity	Model	Capacity
1100 A	520 A	128 KB	510 A	128 KB
	521 A	256 KB	511 A	256 KB
	522 A	384 KB	512 A	384 KB

Accepts up to 128 KB permanent memory.

For more information or the name of your nearest dealer call

KELLY COMPANY
1544 Redwood Drive
Los Altos, CA 94022
(415) 960-0154

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 853 LOS ALTOS, CA

POSTAGE WILL BE PAID BY ADDRESSEE

KELLY COMPANY
1544 Redwood Drive
Los Altos, CA 94022-9990

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 853 LOS ALTOS, CA

POSTAGE WILL BE PAID BY ADDRESSEE

KELLY COMPANY
1544 Redwood Drive
Los Altos, CA 94022-9990

tions for a variety of applications such as navigation and stress analysis. The Solution Books also have the source code in a format for loading via a bar-code wand (reader). After loading, this data can be stored on magnetic cards.

ROM-based packages are also in the works. Typical are the keyword extensions made to BASIC via Math Pac. It's expected that these packages will range from $40—the price of Applications Pacs for the 41s—to less than $300 for a complex program like VisiCalc.

EXPANDING THE HP-71B

The base 71B, priced about $550, does not include a card reader, HP-IL interface or extended memory in ROM and RAM modules. To communicate with the outside world and read in programs, most users will add the HP-IL interface and the card reader. Adding the HP-IL interface allows you to use the existing HP line of peripherals, including mass-storage devices, video display adapter ($225) and connection of the 71B to other computers and instruments. HP's Thermal Plotter/Printer ($450) and other printers with the HP-IL interface can also be hooked to the 71B. These include a strip printer and a full-page printer. The 71B's HP-IL interface is $125. The RS-232-C adapter for the HP-IL loop is $295.

The strip-card reader uses 10-inch hand-pulled magnetic cards similar to those used with the HP 75. Each card has a 1.3K-byte capacity and the card reader costs about $150. Add-on RAM modules will cost about $75 for 4K bytes. A bar-code reader compatible with the HP-IL interface will also be available.

For BASIC program development via the HP-IL and a microcomputer, you need the 71 Development Utility package. It costs $35. The package includes source code and a prerecorded program furnished on a magnetic strip card. A cassette version for use with the HP-IL mass-storage tape drive ($450) will be available from the HP User's library. For advanced programming, you need the FORTH/Assembler ROM. According to HP, it's expected to cost about $150.

HP THIRD-PARTY SUPPORT

All details of the 71B, including source code for the OS, BASIC and FORTH, and the schematics, are available. The OS design is documented in three volumes. Volume I gives a detailed description of how the software is organized and how it works. Examples, like the Spanish-translation LEX file, are included. Volume II details the entry points and the "poll" interfaces. Volume III—over three-inches thick with four reduced-size pages per sheet—gives complete source listings for all modules of the 64K OS. A hardware-specification IDS is also available.

Similarly, there are two IDS manuals for the HP-IL interface module. Volume I gives detailed design specifications and entry points for the HP-IL BASIC extensions. Volume II gives the source-code listings. In addition to the FORTH/Assembler owner's manual, IDS volumes with source listings for this ROM module will also be available.

> Its on-board BASIC in ROM, with over 240 commands, is geared for scientific, engineering and statistical applications.

At present, HP's third-party support is limited to the User's Library and the IDS manuals. HP will make up special keyboard overlays and custom ROM packages in 16K, 32K, 48K and 64K. According to HP, the minimum order for custom ROMs will be at least 50 pieces. HP will also supply custom-recorded versions of the 10-inch magnetic strip cards.

ROM programmer modules or the plug-in ROM carriers will not be available as separate parts—HP will supply only the hard-programmed ROM in the carrier. However, it's a distinct possibility that the manufacturers of accessories for HP equipment will supply ROM programmers. HP says that there are ROM programmers that interface to the HP-IL loop. Quite possibly, the companies that make them will adapt the programmers to the HP ROM chips and make available carriers to plug the ROMs into the 71B. Another possibility is that new support products will appear. Programmers for the new EEPROMs (electrically erasable programmable read-only memory) are also a distinct possibility. The OS of the 71B makes provision for identifying this type of memory.

Volumes I and II of the IDS manuals cost $50 each. Volume III, the complete OS listing, costs $200. The IDS for the HP-IL sells for $75. The FORTH/Assembler manual, included with the ROM, can be bought separately for $20.

Phil Koopman is a computer designer and programmer. He is president of ECS/Software and vice president of engineering of INN Control Systems, Inc., Wood-Ridge, NJ.

HP's critical questions: Does HPTouch significantly improve the user-to-computer interface, and will the office automation market buy it?

PUTTING A FINGER ON THE HP 150

BY BILL CROW

Before Hewlett-Packard designated its new personal computer HP 150, the machine was known in the lab as MAGIC, the memorable acronym for Manager's Alphanumeric & Graphic Information Center. HP's marketing people backed away from this approach, opting to call the 150's magic HPTouch, the touch-sensitive display, which allows users to interact with application programs by touching the screen to select a function, choose an option or move the cursor. This unique technology is an alternative to pressing keyboard controls or moving a mouse.

The name Hewlett-Packard is traditionally associated with high-quality personal computation tools for scientists and engineers. Introduction of the 150 marked the company's jump into the mass-market mainstream with a general-purpose 16-bit computer. The personal computer community has taken notice. Unofficially, HP, expects to ship some 10,000 150s a month, and expects to ship 100,000 by the end of the year.

The 150 features an enhanced MS-DOS 2.0 operating system, 3.5-inch micro-diskette drives, a compact cabinet, compatibility with many existing application programs, and a display screen and related firmware that responds when touched by a finger.

The $3,995 150 is clearly aimed at the business environment, either as a workstation connected to a central computer or as a stand-alone personal computer. The critical question for HP and the office automation market: Does HPTouch significantly improve the user-to-computer interface? The magic touch certainly gives the 150 its technological and marketing identity, and will be a significant factor for those deciding which computer to buy.

A matrix of 40 by 27 infrared emitters and detectors around the perimeter of the screen (hidden in the bezel) crisscrosses a grid directly in front of the display. It detects fingers or any other object near the screen. If a finger proves cumbersome, a pencil eraser will do.

Depending on application software, touching the screen can reposition the cursor, select an item listed on a menu, identify a specific file from a list or initiate a function. But the touch screen's usefulness depends on how the application software is adapted for touch.

USING HPTOUCH

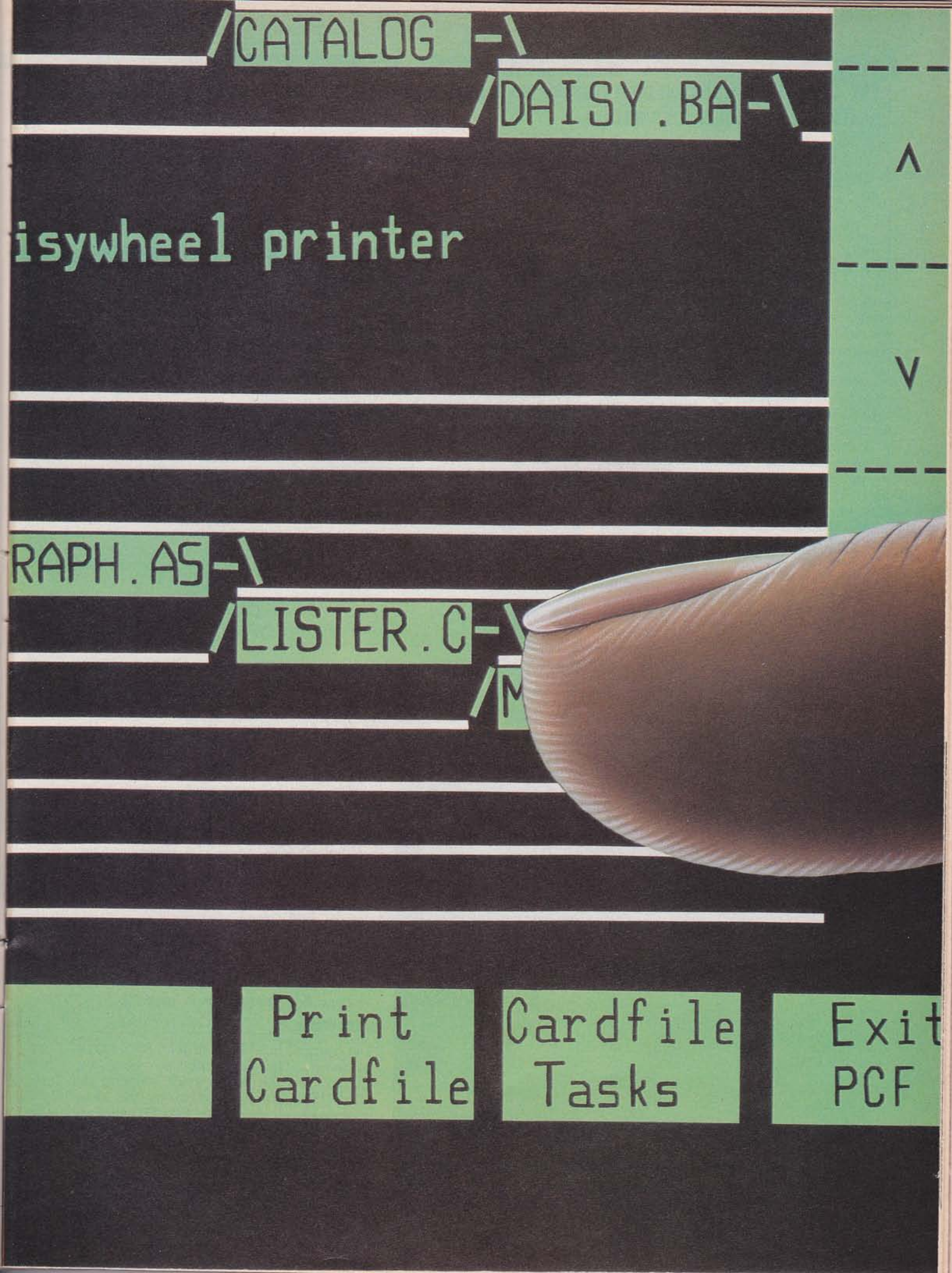
HP's choice of a touch-sensitive display as the technique for pointing to objects on the display is a bold marketing move. Mouse-type controllers are recognized as the standard for this capability. The mouse was introduced in 1981 on the Xerox Star office workstation, then popularized in 1983 by Apple's Lisa personal computer. Now, dozens of manufacturers are adopting mice to allow the user to position the cursor, select items from a menu or move objects on the display. Mouse advantages are rapid cursor control and accuracy.

The mouse's most important disadvantage is the abstract relationship between sliding the device on a desk and the corresponding cursor movements on the display. Effective use of this control is often difficult for the first-time user, and moving it around takes part of the user's concentration from the real tasks of inputting or manipulating data. Also, mice are not practical for portable computers or in cramped quarters because they require extra desk space.

HP considered the touch screen the most natural way for the non-technical operator to interact with the display. First HP had to overcome the problems usually associated with this technology: fingerprints on the display surface, the tiring effect of reaching for the screen, the limited resolution of fingers and cost.

To minimize fingerprints, HP borrowed a little magic from the appliance industry. The screen's surface feels similar to the nappy enamel finish on refrigerators and other appli-

ILLUSTRATION BY TOMMY SOLOSKI


/CATALOG -\
/DAISY.BA-\
^
isywheel printer
v
RAPH.AS-\
/LISTER.C-\
/M
Print Cardfile
Cardfile Tasks
Exit PCF

HPTouch is superior to a mouse as a pointing device. But very little current software exploits its virtues.

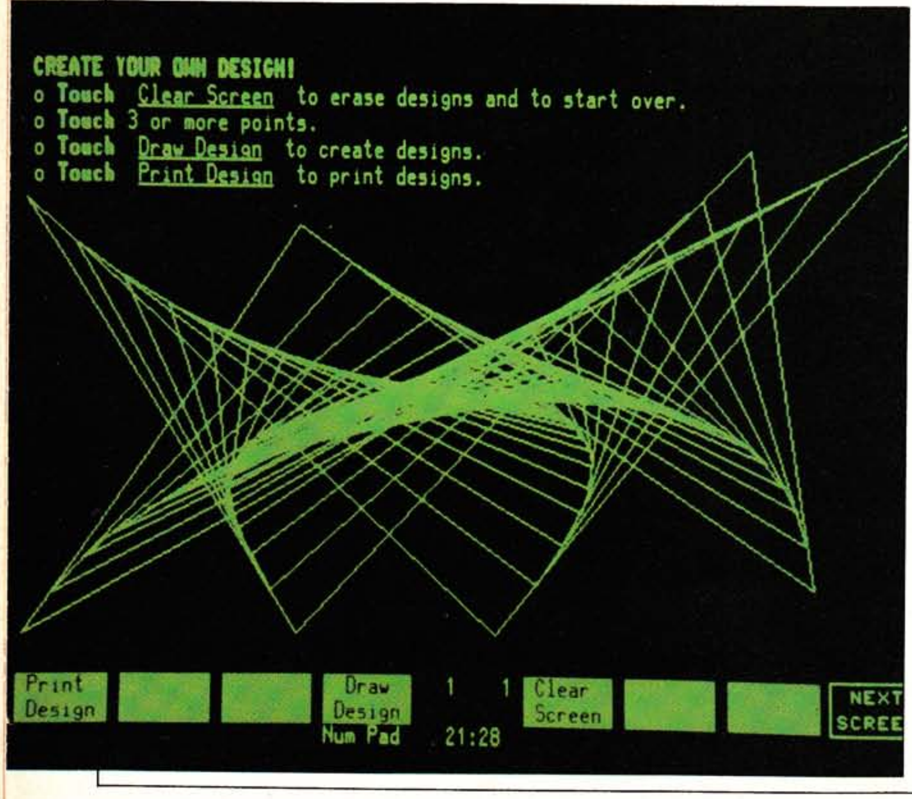
ances that keeps them smudge-free despite daily use. As a result, the 150 stands up to being touched all day long, and rarely needs to be wiped clean of offending prints.

The tiring effects of lifting arm, hand and finger to touch the screen is minimized by the 150's compact size. Its small cabinet brings the nine-inch display much closer to the operator than many other terminals or personal computers, making it easy to reach the screen without lifting an elbow.

But a finger as pointing instrument can lack precision. Trying to move the cursor to one specific character in a text display can really be difficult. The first poke at the screen is always close, but refined pointing can be complicated by hand and finger getting in the way. It is more efficient to use HPTouch to make large cursor movements than fine-tune the position using the keyboard's cursor keys, a technique that also works well when selecting a cell from a VisiCalc spreadsheet.

For those who unshakably believe that only keyboards get along with fingers, all touch-screen operations can still be performed using the cursor control and SELECT keys on the keyboard.

Touching the display is reasonably natural for the first-time user, but still requires practice to develop the proper touching style. The finger must be held perpendicular to the display to avoid activating adjacent locations. A finger touching the screen at too sharp an angle won't correspond to the intersection of the beams from the sensor matrix around the perimeter of the screen. Don't be discouraged. A finger that proves too wide for precise pointing can be replaced by a pencil eraser or other thin, blunt instrument.



```
CREATE YOUR OWN DESIGN!
o Touch  Clear Screen  to erase designs and to start over.
o Touch 3 or more points.
o Touch  Draw Design  to create designs.
o Touch  Print Design  to print designs.
```

Applications (such as touching screen-labeled function keys) are activated the moment a finger is detected, making it easy to accidentally enter the wrong command with a careless touch. This is especially annoying when positioning the cursor at the lower portion of the text window, and inadvertently touching and activating an unwanted command.

Another problem is that when an application is significantly delayed performing the requested function, the 150 provides no feedback acknowledging that a touch was accepted. A user's first reaction is to touch the command again. But the 150 has the annoying habit of remembering redundant touches and executing them in sequence, often performing an unwanted function before the mistake can be corrected.

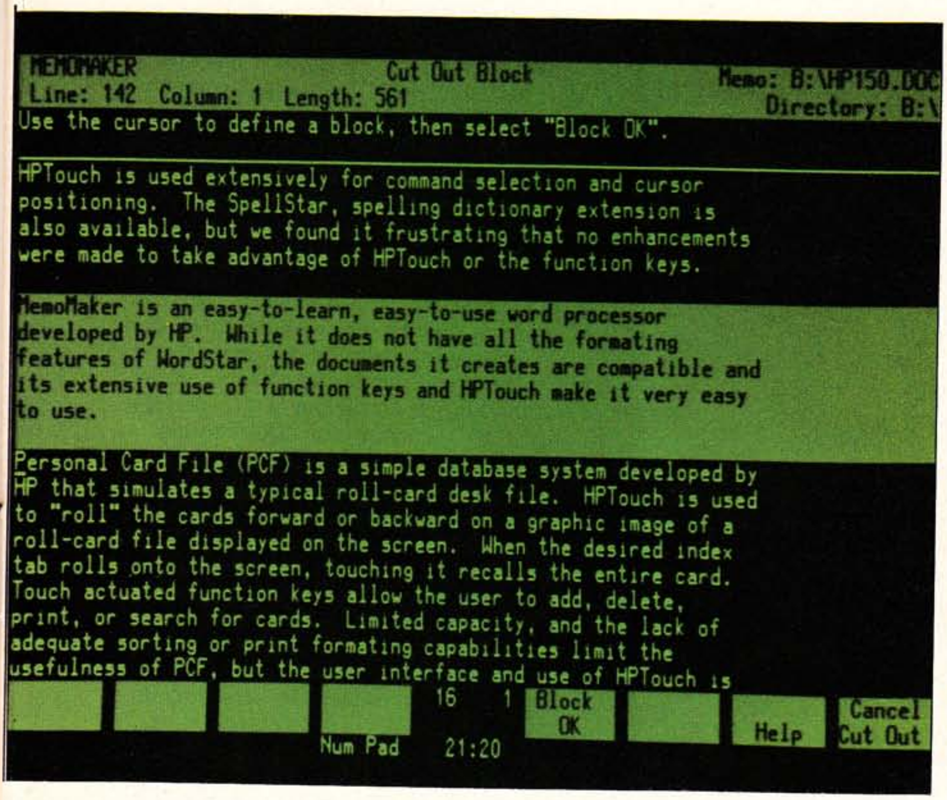
Although there are weaknesses associated with each mode of touch operation, the most noticeable drawback is lack of consistency among different operations. To get the most from HPTouch, HP as well as software vendors must still adopt basic standards defining how a system responds to a user's touch. The natural operation associated with touching the display is a welcome asset to the user interface, but its occasional unpredictability adds needless aggravation.

Adding up debits and credits, HPTouch makes the 150 a very friendly machine to use, and can generally be considered more useful than a mouse or other type of pointing device. Unfortunately, very little current software really exploits its full potential, although HP is working hard to sign up independent software vendors (See vendor listings, page 39).

HARDWARE

The heart of the 150 is an Intel 8088 microprocessor. This alone may not seem significant. But the 8088, which supports the MS-DOS operating system, is the same microprocessor used in the IBM PC and many other popular computers, making the 150 compatible with many application programs already available.

Basic 150 hardware includes 160K bytes of read-only memory (ROM), which contains



```
MEMOMAKER                     Cut Out Block                Memo: B:\HP150.DOC
 Line: 142  Column: 1  Length: 561                          Directory: B:\
Use the cursor to define a block, then select "Block OK".

HPTouch is used extensively for command selection and cursor
positioning.  The SpellStar, spelling dictionary extension is
also available, but we found it frustrating that no enhancements
were made to take advantage of HPTouch or the function keys.

MemoMaker is an easy-to-learn, easy-to-use word processor
developed by HP.  While it does not have all the formating
features of WordStar, the documents it creates are compatible and
its extensive use of function keys and HPTouch make it very easy
to use.

Personal Card File (PCF) is a simple database system developed by
HP that simulates a typical roll-card desk file.  HPTouch is used
to "roll" the cards forward or backward on a graphic image of a
roll-card file displayed on the screen.  When the desired index
tab rolls onto the screen, touching it recalls the entire card.
Touch actuated function keys allow the user to add, delete,
print, or search for cards.  Limited capacity, and the lack of
adequate sorting or print formating capabilities limit the
usefulness of PCF, but the user interface and use of HPTouch is
                                   16    1
                          Num Pad     21:20
```

the input/output (I/O) control and configuration firmware that allows operation as a standalone terminal. Standard main memory size is 256K bytes, which can be expanded to a maximum of 640K bytes. Built-in I/O includes keyboard, display, nine-inch touch screen, two serial ports, an interface for an integral printer, and an HP Interface Bus (HP-IB) port. There is also a built-in clock/calendar with battery backup enabling the 150 to keep the date and time, even when the power is turned off.

Its small package allows the 150 to be kept close at hand without overwhelming limited desk space. All the hardware is squeezed into an enclosure that occupies less than a cubic foot, with room to spare for an optional built-in printer. Complete with dual micro-floppy disk drives and keyboard, the 150 takes up about as much space as an open notebook.

Although its nine-inch (diagonally) format is smaller than many other personal computers, the 150 still provides one of the crispest and most readable displays on the market.

The nine-inch screen is a standard 80 columns by 27 rows on a green phosphorous display. Twenty-four lines are used to display user information, two lines display dynamic labels for eight function keys, and the bottom line shows the time and other terminal status information.

The 150's terminal firmware provides many alphanumeric display enhancements, including inverse video, half-bright, underlining, blinking, bold and italics in any combination. Built-in extended character sets offer line-drawing (for creating forms on the display), mathematical and Greek symbols.

A smooth-scroll option eliminates the jumping effect as each new line is added to the display, making information easy to read. Dozens of other alphanumeric display features are standard in the resident terminal hardware, all contributing to the 150's performance by off-loading tasks from the central processor.

HP has managed to pack into 150 hardware most of the innovations from its eight years of designing computer terminals. Display resolution, for example, of 512 by 390 pixels, enables the 150 to present high resolution graphics. Graphics information is stored separately from alphanumeric information, allowing either to be displayed or changed without affecting the other. As with the alphanumeric display, there are numerous additional features built into the 150's hardware, including multiple-pattern area fill, an addressable graphic cursor, and rubber-band line control.

The HP 2674A integral thermal printer, a $500 option that slips into a special compartment in the top of the 150, can be installed by a user in seconds. It drops into place with a satisfying click, is secured by two push-button latches, and is simultaneously attached to a waiting connector.

In alphanumeric mode, any of the features on the display are faithfully reproduced on paper by the printer. A compressed print mode allows output of reports up to 132 columns wide. The graphics mode, accessed by a single keystroke or touch of the screen, makes it possible to produce a paper copy of the display's graphic image.

A notable drawback of the 2674A is print quality. As a thermal printer, it requires specially treated paper, and its output tends to fade over time. Output quality therefore limits the printer's application to quick drafts or temporary reports.

KEYS

Most applications developed or modified for the 150 exploit the eight dynamic function keys along the top of the conventional qwerty keyboard. Specific key functions identified by labels along the base of the screen display are activated by either pressing the appropriate key or touching the key label on the display. Depending on application, touching a function can call up a program, execute a command or select another subset of eight optional functions. Its usefulness, however, depends on its implementation within a specific application program.

The keycaps of the low-profile 150 keyboard are sculptured for comfortable typing. The keys have a broad surface and smooth travel with a positive mechanical click at the bottom of their stroke. The 107 keys include a complete alpha keyboard, separate numeric pad, editing and display control keys, and the dynamic function keys.

Four unlabeled keys above the numeric pad have, at press time, no defined purpose, but are expected to access additional functions via future application software.

A fold-down support unscrews from the back of the keyboard to conveniently adjust the typing angle, but the keyboard raised too high can get in the way of the disk drives. The keyboard's otherwise thoughtful design also allows the computer-link cable to exit from either side of the keyboard.

MEMORY

Mass storage is provided by any member of HP's family of small disk drives, but the 150 is typically configured with the HP 9121 dual micro-floppy disk drive. Micro-floppy disks were designed and developed by Sony Corporation, which in turn sells HP its diskettes and drives.

A standard 3.5-inch diskettes, enclosed in a hard plastic case, is capable of storing 270K bytes of information. The case has a spring-loaded shutter to protect the read/write access opening.

Although these diskettes are more expensive than their more common 5.25-inch counterparts, they are far more reliable because of their protected enclosure, and 3.5-inch disk drives already cost less. When double-sided, double-density 3.5-inch disks become available, their one-megabyte capacity is expected to make them a clear mass-storage leader.

For more demanding applications, the 150 can be hooked up to either a 5M byte or a 10M byte Winchester disk drive. These high-capacity fixed disks are packaged with a single micro-floppy diskette drive, which is about twice the height of the standard micro-floppy drive, but requires no more desk space.

COMMUNICATIONS

The 150 has two serial ports to permit connection to a modem, remote computer, printer, plotter or any other serial device with an industry-standard RS-232-C interface. The 150's configuration capability, along with MS-DOS operating system, make device assignments independent of application program, thus allowing devices to be changed without modifying or reconfiguring every application. The HP Interface Bus, the primary device interface, is an intelligent parallel interface used on almost every HP computer system, from personal computers to HP's largest business machine.

Developed by HP and adopted in the 1970s as an industry standard (as the IEEE-488 interface standard), the IB allows up to 14 different peripheral devices to be daisy-chained to the same connector. Each device has a specific address on the bus and responds when polled by the computer. Besides connecting all disk drives to the 150, the IB also interfaces printers, plotters and other devices. The IB gives the 150 a greater device-interface capability than most current personal computers, including the IBM PC and its numerous clones.

Indeed, HP has packed into the 150's limited volume more I/O capability than the average user will ever want. The 150's two option slots enable expansion. Expanding memory beyond the 256K-byte standard size requires one slot. Future expansion-slot peripherals will include a 1.2-Kbit/s autodial, autoanswer modem, and a 3270 synchronous interface for connection to IBM mainframes.

JUMPING ON THE MS-DOS BANDWAGON

Introduced in 1982 by MicroSoft, Inc. (Bellevue, WA), MS-DOS has become the de facto standard operating system for 16-bit personal computers. To take advantage of the wide range of software being developed for the IBM PC, most computer manufacturers either support or plan to support MS-DOS. HP is no exception.

However, for the 150, HP has traded full compatibility with the IBM PC, instead adding unique features and capabilities. Not every IBM software package will run on the 150. More importantly, a 5.25-inch disk will not run on a 3.5-inch drive. Even if it were possible to transform a 5.25-inch PC program onto a 3.5-inch disk, many of the program's instructions (written for specific PC hardware) wouldn't do anything for the 150. The small subset of MS-DOS programs not dependent on hardware and copied onto a 3.5-inch disk could run on the 150. In any case, the average consumer couldn't copy the program.

A major HP enhancement to MS-DOS is the Personal Applications Manager, commonly known as PAM, which is a touch-screen-controlled user interface for the operating sys-

Although 3.5-inch diskettes cost more than their 5.25-inch counterparts, they are more reliable, and 3.5-inch drives cost less.

SPECIFICATIONS

- Intel 8088 microprocessor operating at 8mHz
- HP-enhanced MS-DOS 2.0 operating system
- Screen size: 9 inches measured diagonally
- Screen capacity: 24 lines by 80 columns (1,920 characters)
- On-screen graphics
- Built-in HPTouch, the touch-sensitive screen
- High-resolution image size:
  Alphanumeric: 116mm by 150mm (4.5″ by 5.9″)
  Graphics: 120mm by 160mm (4.7″ by 6.3″)
- 256K bytes of main memory, expandable to 640K bytes
- Battery backup and real time clock
- Detachable typewriter-style keyboard with 107 keys
- Two RS-232 communications ports and one HP-IB port for peripherals
- Mass storage options:
  HP 9121D: 264192 bytes
  9133V: 4.8M
  9133XV/9134XV: 14.5M
- Printer options:
  HP 2764A internal thermal dot matrix
  2601A letter quality
  2602A letter quality
  82905B dot matrix
  82906A dot matrix
  2932A dot matrix

tem. Via PAM and associated subsystems, users can select application programs, format diskettes, delete, browse, copy, rename and backup files, reconfigure devices, and perform many other tasks without entering a single MS-DOS command. All features are controlled by touching the display to select and initiate functions.

PAM is a tremendous asset for the novice user, but can be a mixed blessing for experienced users of MS-DOS. Some features are faster and easier with touch control, but others are complicated by this otherwise easy-to-use interface.

For the diehard MS-DOS user, HP provides a stripped-down version of the MS-DOS command interpreter. But it lacks many advanced features, such as pipes, filters and disk utilities. The 150 Owners Manual suggests that these capabilities are available on an optional Programmer's Pac disk, the price and release date of which haven't been announced.

THE 150 IN ACTION

Operating the 150 can be an acute contradiction. Although easy and natural to interact with by touching desired functions shown on the screen, operation can be frustrating when presented with endless levels of menus or when coaxing HPTouch's occasional quirks to produce desired results. Overall, the 150 is easy and enjoyable to use, but frequently poor design or inadequate documentation make simple tasks unnecessarily difficult.

Hardware installation is literally a snap. The manual's clear diagram shows how to quickly cable together processor, disk drives, keyboard and peripherals. Applying power to the machine initiates an extensive diagnostic program for testing internal 150 components, and other built-in diagnostics allow the user to align the touch screen or initiate other device and system tests.

Once the 150 is connected and powered the user may get into trouble. Standard HP-provided documentation gives limited assistance on what to do next. One possibility is to try the Computer Tutor introductory training software that comes with the computer. Computer Tutor, which takes a user on a self-guided tour through some of the 150's features and functions, is easy to follow, sometimes informative, but occasionally misleading. For example, the passage about floppy disks says a flashing light on the drive indicates worn-out disks. Novice users seeing lots of flashing lights can think disks are worn out when they're not. Although Computer Tutor helps the user become familiar with the 150's keyboard and touch display, it offers little practical information.

Configuring the 150 and MS-DOS operating system to recognize all 150 devices and options is also not simple. There are multiple menus with a seemingly endless variety of selections for configuring device interfaces under control of the terminal firmware.

An MS-DOS configuration utility matches the different hardware devices to the device identifiers recognized by the operating system. The documentation provides all necessary factual information, but no step-by-step guide to assist the novice trying to get the machine to do something. Unless the user is particularly adept at the ins and outs of interfacing and configuring computers, it is highly recommended that he have the dealer or HP representative put together his first 150.

Built-in 150 software—MS-DOS, Personal Applications Manager, and File Manager—consume 100K bytes of main memory just to operate.

WHAT TO DO

When starting the 150 with the master diskette, PAM presents a touch menu of applications available from currently-loaded disks. The function keys at the base of the display can initiate other options or utilities, including the File Manager.

Via File Manager and HPTouch, a user can touch an on-screen filename to copy, rename, delete, print or display the related file. Several application programs allow File Manager to be accessed without exiting from the application, making this general-purpose disk maintenance utility available at almost any time.

This is a welcome change from most personal computers, which usually provide limited and incompatible file utilities or, to manipulate files, require terminating the program and returning to the operating system.

File Manager, although providing many conveniences, can certainly be improved. It uses HPTouch extensively, but numerous common tasks, such as selecting an alternate disk drive or paging through a long directory, forces the user to return to the keyboard. Other functions maintain logical consistency at the expense of intuitive operation to achieve their goals. For example, a user who wants to display a disk's directory must first touch the CHOOSE DIR function, type the disk identifier, touch START DISPLAY, and finally touch EXIT CHOOSE to go on to the next step. The last two steps maintain logical consistency between all steps, but seem unnecessary to accomplish the task. Selecting the function and providing the necessary identifier should be enough. Additional steps only confuse an otherwise simple task.

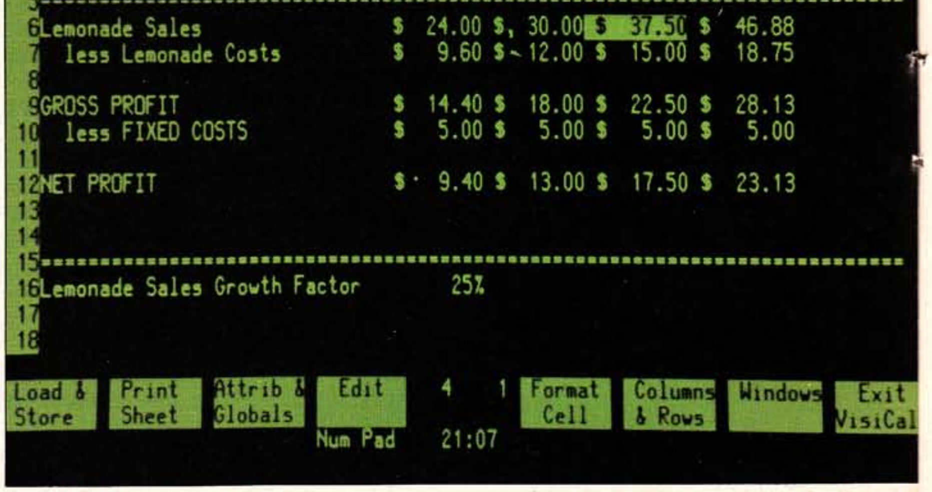
Several other utilities are also included in the 150's operating software. FORMAT is required to prepare new diskettes for use or to recycle used disks for new applications. COPY/BACKUP, for example, is an essential tool for protecting valuable software from diskette failure. INSTALL and SET UP PAM are used to set up application diskettes, allowing programs to be displayed on PAM's master menu. The MS-DOS device configuration is accomplished by running DEV CONFIG.

MEASURING UP

Compared with the wide range of personal computers based on Intel's family of microprocessors, the 150 offers some exceptional performance. Dedicated hardware that controls 150 terminal operation allows either graphic or alphanumeric information to be displayed at impressive speeds. The 8088 microprocessor's clock speed of 8mHz compares favorably with the IBM PC's 5mHz. The intelligent interface bus and a dedicated processor to manage keyboard and touch screen also contribute to the 150's excellent performance.

Many of the 150's built-in software features consume a large amount of available resources. The 256K bytes of main memory may be large by some standards, but since MS-DOS, PAM, and File Manager consume nearly 100K bytes, the 150 must use that much memory just to operate. Likewise, extensive error checking routines, help menus and touch-controlled screens all require additional storage and computing resources to operate.

Actual performance as perceived by the user usually depends on specific applications software rather than on the processor's raw operating speed. Using selected benchmarks based on the BASIC interpreter and a spreadsheet program help compare the 150 with other personal computers, the results of which are in the Table. Reviewing these results, remember that performance often depends more on the user's perception than on the processor's speed. All software applications make the user wait while completing a function, but a slower computer may appear to provide better performance than one actually running faster.



```
VisiCalc                         Main                    Worksheet: LEMONAD
D6 /F C$ NF2 (V) (B16+1)*C6                                                C
Type ? for Help at any time                                               99

                  A                 B         C         D         E        F
 1                    Lamont's Lemonade Stand
 2                 Projected Income Statement for July
 3
 4          week of:                July 7  July 14  July 21  July 28
 5-----------------------------------------------------------------------
 6Lemonade Sales               $  24.00 $  30.00 $  37.50 $  46.88
 7  less Lemonade Costs        $   9.60 $  12.00 $  15.00 $  18.75
 8
 9GROSS PROFIT                 $  14.40 $  18.00 $  22.50 $  28.13
10  less FIXED COSTS           $   5.00 $   5.00 $   5.00 $   5.00
11
12NET PROFIT                   $   9.40 $  13.00 $  17.50 $  23.13
13
14
15=======================================================================
16Lemonade Sales Growth Factor        25%
17
18
```

The Heavy Calculation program used for the benchmark runs under the BASIC interpreter and is entirely processor dependent as it computes prime numbers from one through one thousand. The spreadsheet test updates a worksheet of 121 cells with mostly simple formulas.

ON-PAPER PERFORMANCE

Documentation for the 150 is disappointing. The manuals are well written and nicely layed out, but offer little assistance when trying to learn about the machine or how to use it. There are two 150 manuals: The Terminal User's Guide, which provides all necessary information for using the 150 only as a terminal without disk drives and never operating under MS-DOS as a personal computer, and The HP 150 Reference Manual, which gives information about setup as a personal computer operating under MS-DOS, PAM and related utilities.

There is no help at all to lead the first-time user through recommended steps to bring up MS-DOS and use it effectively in day-to-day operations.

A spokesperson from HP's Personal Software Division acknowledged these shortcomings and said that a series of first-time-user guides are being developed for the 150 as well as for each HP-developed application program. These guides will ultimately be packed with the products, and will include a step-by-step approach for the novice user.

APPLICATIONS

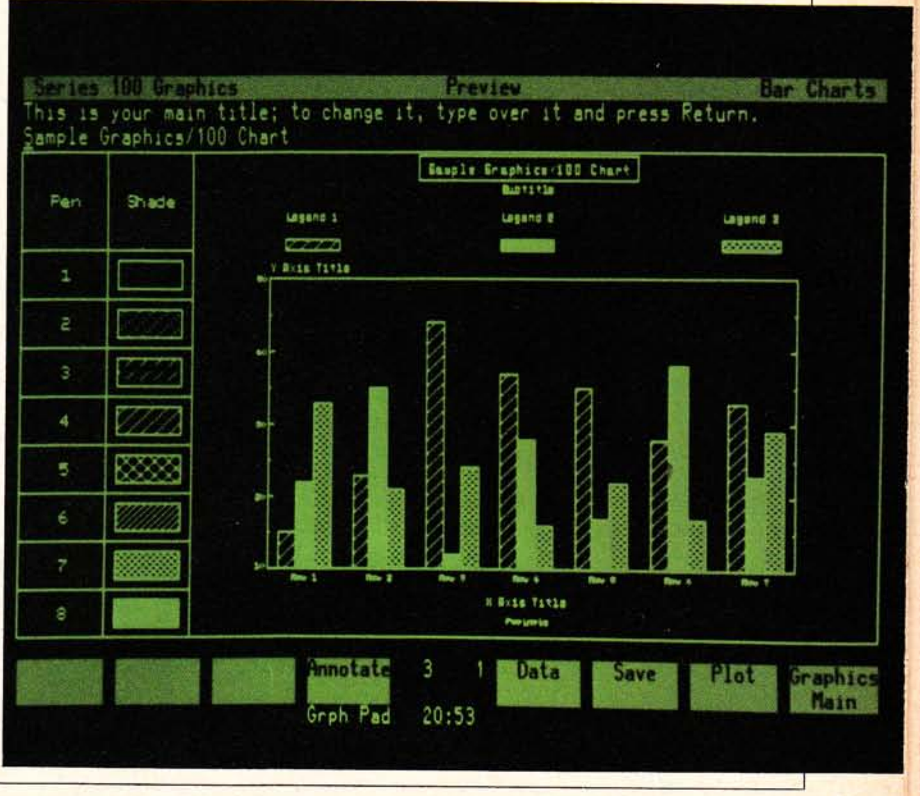
Although HPTouch provides the basic capability to detect the presence of a user's finger at the display, how the software uses fingers makes all the difference. Recognizing the touch, providing feedback to the user, determining the function being selected, and doing what's expected of the computer vary considerably among different application programs. Some make HPTouch a welcome asset to the application, others make the touch screen a constant source of aggravation.

Most applications benefit from the addition of HPTouch; others don't recognize or exploit its true potential. Frustrations with the File Manager exist in part because HPTouch is used to mimic a command-driven machine. Even operations completely performed by touch still follow the monotomy of typing cryptic commands with exacting syntax requirements. This restriction applies to WordStar where HPTouch provides a one-for-one alternative to typing commands. Cursor positioning is the only HPTouch operation that is truly natural and intuitive. Even so, touch-activated commands make WordStar on the 150 easier to use than on other machines.

There was already an impressive amount of applications software available for the 150 when the machine was introduced last year, and the list has grown considerably. HP has since developed applications exclusively for the 150, and many independent software vendors have converted their applications to run on the 150. Here's a quick summary of what's available from HP.

VisiCalc, licensed from VisiCorp, was rewritten by HP for the 150. The HP version makes extensive use of the screen-labeled function keys, and uses HPTouch for cursor positioning and selecting function key commands.

WordStar, from MicroPro International, is converted from the IBM PC version and is being sold through HP with HP packaging and documentation. Instead of the cumbersome WordStar character-control sequences, numerous HP enhancements use the screen-labeled function keys to execute commands. HPTouch is used extensively for command selection and cursor positioning. SpellStar, WordStar's spelling dictionary extension is also available, but doesn't take advantage of HPTouch or the function keys.



This is your main title; to change it, type over it and press Return.

Sample Graphics/100 Chart

Personal Card File, notable 150 data base software, simulates a Rolodex card file, using HPTouch to flip through the cards.

SYSTEM	HP 150	IBM PC	HP 120	HP 200	HP 86B
Processor	8088	8088	Z80	68000	Proprietary
BASIC	MicroSoft	Personal	Microsoft	HP	HP
Calculation	661	781	935	82	1449
Spreadsheet	VisiCalc 4.3	SuperCalc 6.5	VisiCalc 2.3	Context 4.9	VisiCalc 12.5

(all times in seconds)

Personal Card File is a simple data base system developed by HP that simulates a typical Rolodex card file. HPTouch is used to "roll" the cards forward or backward on an on-screen image of a roll-card file. Touching the desired index tab as it rolls by recalls the entire card. Touch-actuated function keys allow the user to add, delete, print or search for cards. Limited capacity and lack of adequate sorting or print formatting limit its usefulness, but the user interface and use of HPTouch is first rate.

MemoMaker is an easy-to-learn, easy-to-use word processor developed by HP. Although lacking some of the formatting features of WordStar, MemoMaker-generated documents are compatible with WordStar. And its extensive use of function keys and HPTouch make it very easy to use.

Picture Perfect from Computer Support Corp. is an elaborate system for making business charts. It offers a variety of formatting options and chart features, accommodating virtually any chart-making requirement. It was completely rewritten for the 150, and uses HPTouch for everything from command selection to positioning chart components on the screen. It is working proof of the HPTouch's capabilities and benefits.

Series 100 Graphics is a flexible software system developed by HP for creating standard business charts (e.g., pie, bar, line and text charts). It makes extensive and effective use of HPTouch and the function keys, and supports a wide range of output options.

DSNLink, an HP-developed communications system, provides extensive capabilities for transferring files between a 150 and an HP 3000 minicomputer or another 150. It can also be used for communications and simple file uploading and downloading with almost any computer. And it features an extensive macro language to easily set up configuration information and provide automatic dialing, connection and information transfer.

Dozens of other applications are available or are now being written for the 150. Among them are: 1-2-3 (Lotus Corp.), Diagraph (Computer Support Corp.), Condor data base system (Condor Computer Corp.), RMASE 4000 Relational Data Base System and Report Writer (Microrim), TK!Solver (Software Arts), MicroPlan (Chang Labs), Pertmaster (Westminster Software), BPI/General Accounting System (BPI Systems), and STATPAK (Northwest Analytical).

Current software to assist a 150 programmer is limited. What's available is Series 100/BASIC, a plain vanilla version of Microsoft's BASIC interpreter, but its first release doesn't contain any special features to support graphics, HPTouch or function keys. For now, these capabilities can be controlled by transmitting the appropriate terminal control character sequences to the display. This approach, while workable, is slow to execute and cumbersome to program.

HP promises a full line of program development tools in the months to come, including an enhanced version of BASIC and a BASIC compiler. Other languages that will be available include FORTRAN, PASCAL and C. HP, it is hoped, will provide the necessary documentation to access the internal AGIOS (Alphanumeric/Graphic Input/Output System), giving a programmer easy access to this extensive library of system routines to get the most from the 150's advanced features.

THE SOFTWARE

The following are the first 68 independent software vendors (ISVs) to sign HP 150-software-supplier agreements with Hewlett-Packard. Many are visionary startup firms, the ink barely dry on their incorporation forms. Others have instantly recognizable reputations for quality software and aim to claim a segment of the potentially lucrative 150 market.

Each of these vendors will produce and market its own products under its own label, as outlined in the following directory. None of these products will be marketed by HP (for now) or bear the HP label. HP will, however, promote them and the vendors by publishing a 150 software catalog. HP also gives all ISVs a 40 percent discount off the purchase price of 150 computers and components.

Unlike the many MS-DOS programs available to microcomputer users that are only nominally 150-compatible, software produced by ISVs is reviewed and certified by HP itself as performing functions while taking advantage of the wonders of such 150 features as HPTouch, softkeys, user-defined menus, 3.5-inch disks and 107 keyboard keys.

This directory, which will be updated from issue to issue, is in two parts: The first includes software that can be bought, inserted and used today. The second includes software that will be available in the months to come.

INDEPENDENT SOFTWARE VENDOR	**(AVAILABLE NOW) APPLICATION**	**PHONE**
Balcones Computer Corp. **5910 Courtyard** **Austin, TX 78731**	The Boss accounting system	(512) 346-1771
Commercial Micro Systems **31360 Via Colinas, Suite 103** **Westlake Village, CA 91362**	Step 1 accounting series	(213) 991-6030
Houseman and Associates **11711 Jones Rd.** **Houston, TX 77070**	PC CAD, computer-aided design	(713) 890-5160
Management Software **1203 Berry Rd.** **Knoxville, TN 37920**	Time billing, accounting, retail shoe management, job cost	(615) 573-6316
Micro Associates, Inc. **2300 Highway 365, Suite 510** **Nederland, TX 77627**	MICA accounting series	(409) 724-6583
Microrim, Inc. **1750 112th, N.E.** **Bellevue, WA 98004**	Rbase 4000	(206) 453-6017
Northwest Analytical, Inc. **1532 S.W. Morrison St.** **Portland, OR 97295**	Statpak	(503) 224-7727
Palmer Berge **1200 Westlake Ave. North** **Seattle, WA 98109**	Real estate	(206) 284-7610
Production Data Systems **2386 Fair Oaks Blvd., Suite 210** **Sacramento, CA 95825**	The Accounting Journal (TAJ)	(916) 484-0155
Profit Management Systems, Inc. **3637 Fourth St. North, Suite 350** **St. Petersburg, FL 33704**	The Practice, Forecash	(813) 822-1793
Telesun Corp. **404 East 4500 South, Box A2** **Salt Lake City, UT 84107**	Telesun communicator package	(801) 261-4936

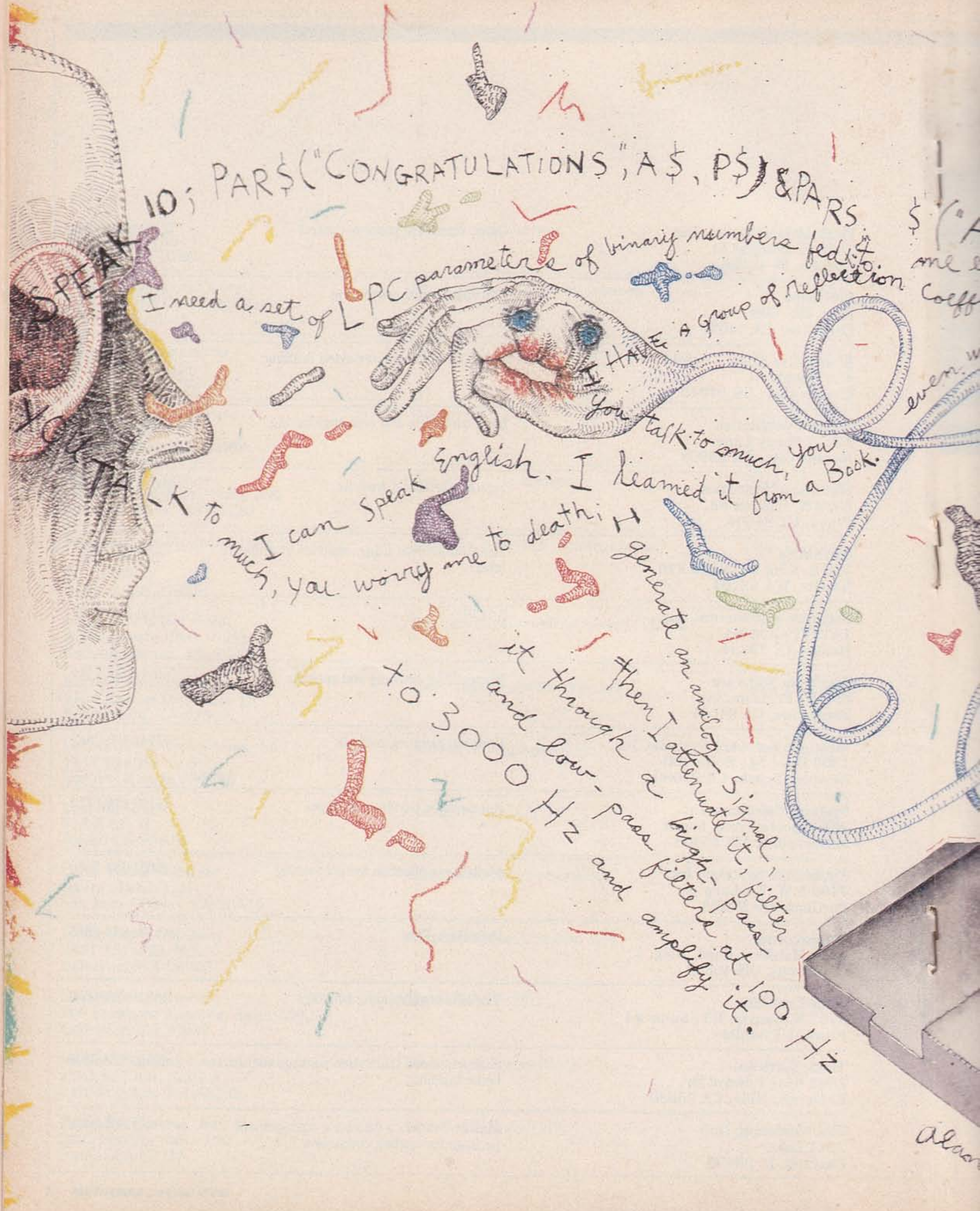
T. R. Associates **One Export Lane** **Archibald, PA 18403**	Financial packages for business professionals (doctors, etc.)	(717) 876-4067
Westminster Software, Inc. **3000 Sand Hill Rd.** **Bldg. 4, Suite 245** **Menlo Park, CA 94025**	Pertmaster	(415) 854-1400

INDEPENDENT SOFTWARE VENDOR	(AVAILABLE SOON) APPLICATION	PHONE
Abacus Data, Inc. **100 California St.** **San Francisco, CA 94111**	Informa, a data base management system	(415) 479-6180
Alan Fry Associates **3207 Halverson** **Bremerton, WA 98310**	Pharmacy prescription records	(206) 373-0666
Applied Research and Consulting, Inc. **2938 N. Madison Ave.** **Loveland, CO 80537**	Graphics	(303) 663-3223
ASK Micro, Inc. **100 Blue Ravine Rd.** **Folsom, CA 95630**	Accounting Plus	(916) 985-6555
BactBob Software **101 Grove, Rm. 419** **San Francisco, CA 94012**	Microbiology laboratory	(415) 558-3004
Bear Software Corp. **3635 Dewey Ave.** **Rochester, NY 14616**	Integrated decision support; CAD system for sewing industry	(716) 663-3120
Bill Boston Cycles **P. O. Box 114** **Swedesboro, NJ 08055**	Micro-Bike for custom-designing bicycles	(609) 467-1002
Borland International, Inc. **4807 Scotts Valley Rd.** **Scotts Valley, CA 95066**	Turbo Pascal	(408) 438-8400
Brubaker and Associates, Inc. **116 W. Main St.** **Deolphi, IN 46923**	Farm Profit Plan Series	(317) 564-2584
Calculus dba ABACUS **4228 Park Ave. South** **Minneapolis, MN 55407**	Library systems	(612) 827-2689
California Computer Applications **2541 Manchester** **Cardiff, CA 92007**	Series/100 BASIC graphics enhancements	(619) 755-4047

CAM Software Research Lab **105 Design & Technology Bldg.** **Provo, UT 84602**	DCLASS engineering language	(801) 378-3895
Central Resources Corp. **919 Third Ave.** **New York, NY 10022**	Energex, oil/gas well development	(212) 826-2323
Certified Software, Inc. **9900 S.W. Wilshire** **Portland, OR 97225**	Certified Accounting System	(503) 297-8666
COMP Systems, Inc. **9655 S. Dixie Hwy., Suite 100** **Miami, FL 33156**	Loan processing systems	(305) 666-3783
Computing Capabilities Corp. **465A Fairchild Dr. #122** **Mountain View, CA 94043**	Local/mainframe interface	(415) 777-0470
Concentric Data Systems, Inc. **18 Lyman St.** **Westboro, MA 01581**	Concentric Information Processor, a database management system	(617) 366-1122
CPU, Inc. **30448 Via Victoria** **Rancho Palos Verdes, CA 90274**	Small business accounting	(213) 541-0339
DataSystems Software Corp. **1333 Lawrence Expressway, Suite 250** **Santa Clara, CA 95051**	DataManager, an applications development tool	(408) 247-9900
DBi Software Products **One Energy Pl.** **5805 E. Richard** **Mount Pleasant, MI 48858**	Statistical processing system	(517) 772-5055
DeMeritt Data Systems, Inc. **440 N. Eisenhower Lane** **Lombard, IL 60148**	DDS Travel Line	(312) 953-1667
Design Solutions **732 Sixth Ave.** **Aurora, IL 60505**	Truss/1 for analysing truss structures	(312) 898-2051
Digital Information Systems Corp. **3336 Bradshaw Rd., Suite 340** **Sacramento, CA 95827**	DBL (Data Business Language)	(916) 363-7385
Econoware, Inc. **1750 30th, Suite 77A** **Boulder, CO 80301**	Structural engineering software	(303) 444-0726
Engineered Software **2420 Edgewood Dr.** **Olympia, WA 98501**	Computer aids for piping	(206) 786-8545

Execucom **P. O. Box 9758** **Austin, TX 78766**	IFPS, financial analysis	(512) 346-4980
Frontier Computer Corp. **2630 W. Durham Ferry Rd.** **Tracy, CA 95376**	Ranch and farm record management	(209) 836-2098
Genesis Data Systems **821 N.W. 13th St.** **Gainesville, FL 32601**	GDS-1, a two-dimensional drafting package	(904) 371-7599
Heikki Ketola Software **942 20th St.** **Santa Monica, CA 90403**	Bonds/150	(213) 828-9406
Innovative Software **9300 W. 110th St., Suite 380** **Overland Park, KS 66210**	The Smart Data Manager	(913) 383-1089
International Financial Data Systems, Inc. (IFDS) **Box 888870** **Atlanta, GA 30356**	Maxi-Plan, a financial planning system	(404) 256-6447
Joseki Computer Corp. **2604 Artesia Blvd., Suite 5** **Redondo Beach, CA 90278**	Time and Expense Billing System (TEBS)	(213) 374-3251
Karris Engineering **4100 Easton Dr., Suite 13** **Bakersfield, CA 93309**	Allen-Bradley controller interface	(805) 322-4170
Laboratory Microsystems, Inc. **4147 Beethoven St.** **Los Angeles, CA 90066**	PC/FORTH language system	(415) 964-2706
Lexisoft, Inc. **712 Fifth St.** **Davis, CA 95616**	Spellbinder (WORD/125)	(916) 758-3630
Light-Touch Software **Sierra Madre 12B** **San Luis Obispo, CA 93410**	Calender for time management	(805) 546-4522
Lloyd Henry Company **2421 131st Pl. N.E.** **Bellevue, WA 98005**	Bank management decision tools	(206) 881-2589
Mainstreet Software **700 Larkspur Landing, Suite 109** **Larkspur, CA 94939**	The Mainstreet Filer	(415) 332-1274
Medical Systems Consultants **1033 E. First, Suite 4** **Port Angeles, WA 98362**	Medical systems packages	(206) 452-2983
Pathway Systems, Inc. **2222 Martin, Suite 100** **Irvine, CA 92715**	Medi-Forth, Hospi-Forth	(714) 975-0383

Paul Hertzler & Co., Inc. 1329 E. Douglas St. Goshen, IN 46526	QA/S, statistical process control	(219) 533-0146
Protracoa P. O. Box 609 Los Altos, CA 94022	Protrastar word processing	(415) 948-1177
Responsive Logic 156 Donald St. Oregon City, OR 97045	Touch-Draft, computer-aided drafting	(503) 655-4980
Sierra Cybernetics 12212 Shady Lane Nevada City, CA 95959	Land surveying and civil engineering	(916) 265-8833
Significant Statistics 3336 N. Canyon Rd. Provo, UT 84604	Sigstat, statistical analysis	(801) 377-4860
Softronics 100 S. King St., Suite 270 Seattle, WA 98104	The Competitive Edge, analysis of property offers	(206) 587-0688
Software Automation, Inc. 14333 Proton Rd. Dallas, TX 75234	SALVO	(214) 392-2802
Spectrum Software 690 W. Fremont Ave. Sunnyvale, CA 94087	Micro-CAD, drawing and analysis	(408) 738-4387
Strategic Software Systems, Inc. 1300 Dove St., Suite 200 Newport Beach, CA 92660	Financial planning/analysis	(714) 476-2842
Systems Solutions, Inc. 2650 Nicolett Ave. South Minneapolis, MN 55408	Renaissance payables manager	(612) 871-5713
Timberline Systems, Inc. 7180 S.W. Fir Loop Portland, OR 97223	Medallion Collection for accounting	(503) 684-3660
Tominy, Inc. 4221 Malsbary Road, Bldg. 1 Cincinnati, OH 45242	Data Base-Plus	(513) 984-6605
TransEra Corp. 3707 N. Canyon Rd., Suite #4 Provo, UT 84604	TBASIC programming language	(801) 224-6550
Traux Software 2862 King Edward Dr. El Dorado Hills, CA 95630	Estimating and fabrication package for home building	(916) 933-3478
The Wordshop, Inc. 3514 Lake Lasyang, IL 60438	Master Trader, a data base management package for trading companies	(312) 895-4774


SPEAK 10; PAR$("CONGRATULATIONS",A$,P$) &PARS $("A
I need a set of LPC parameters of binary numbers fed it to me e
I HAVE a group of reflection coeff
even w
YOU TALK to much, you worry me to death;
I can speak English. I learned it from a Book.
You talk to much, you
H generate an analog signal, filter then I attenuate it, filter it through a high-pass filters at 100 Hz and low-pass filters at 3000 Hz and amplify it.
alan

("ACE",A$,P$)
ne every 25 miliseconds.
coefficients that change the characteristics of the speech filter in the synthesizer.
en. worrys my Pet.
Alan E. Cober 84

The new HP speech synthesis module for Series 80 was designed for both the serious software writer and the hobbyist.

SERIES 80 TALKS BACK

BY LOREN KOEHLER

Why would one want a talking computer? We have cars that remind you when you've left the key in the ignition and phones that alert you when your receiver is off the hook. So a computer that talks is logical in view of the growth of personal computer use. And talking is probably the most natural means of communication.

It's been said that "user friendly" really means idiot proof. But computer users are ordinary people—people who make mistakes, need instructions, want to be warned when the machine's about to break down or when the job's done, and who need praise. What better way to do these things and improve the quality of interaction between people and their computers than with a human voice. That's what speech synthesis can do.

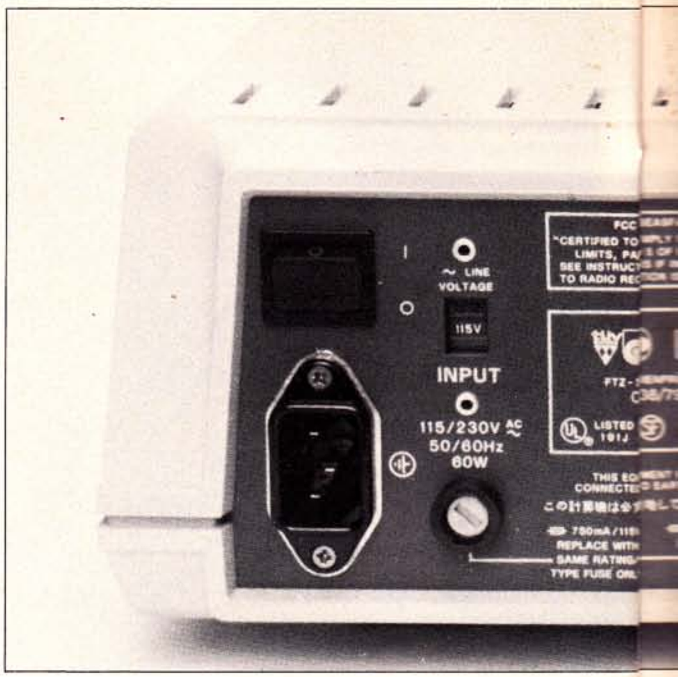
We'll talk about a software/hardware approach to speech synthesis using the new HP 82967A Speech Synthesis Module for HP Series 80 personal computers. This module was designed to meet the needs of both the serious software writer and the hobbyist. Enough software and documentation is available for a wide variety of speech synthesis tasks.

Two popular approaches to speech synthesis are 1) phonetic synthesis, and 2) analysis/synthesis. The HP 82967A makes use of an analysis/synthesis technique called linear predictive coding (LPC). We'll discuss LPC analysis/synthesis here.

The phonetic approach allows your computer to verbalize the full set of words in a given language. LPC-type speech can produce very high quality English and foreign-language speech. But what's really needed is a speech synthesis approach that has the word generation flexibility of phonetic text-to-speech systems without sacrificing the high quality and multiple-language capability of LPC. And at a reasonable price.

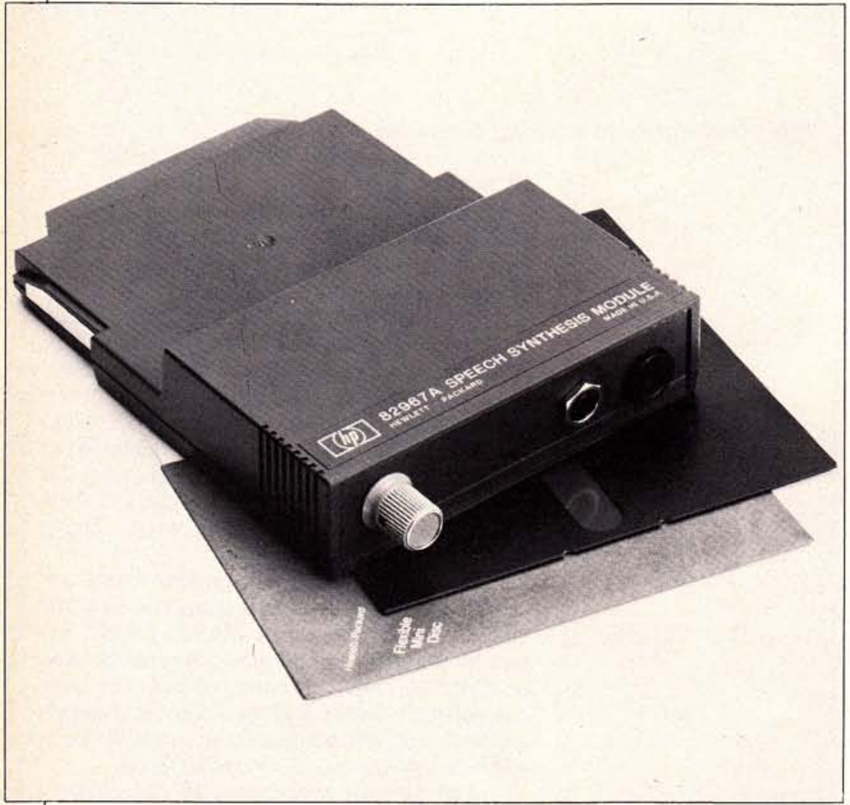
ILLUSTRATION BY ALAN COBER

Generating a word takes just a few minutes thanks to a powerful and friendly user interface.



The quality of voice output has a direct bearing on how it can be used. Quality, in this discussion, will be divided into two categories: intelligibility and how closely the synthetic speech sounds like the human voice.

Intelligibility means how easy it is to distinguish what is being said. Some speech systems are very intelligible, but require great motivation from the user to listen to the speech for any length of time. This isn't surprising because it's sometimes tiring to listen to other people, especially if they talk in a monotone. The second quality, human-likeness, is very subjective—what sounds pleasing to you might sound pallid to your neighbor. The important point is that as synthetic speech sounds more like the real thing, the motivation required to listen to it becomes lower.



A key aspect of the use of speech synthesis is how well the speech output hardware and software are integrated with the system. Is the vocabulary sufficient for your needs? How easy is it to incorporate voice output into your programming?

A talking computer can be a novelty for a while, but using speech as a computer tool requires that the speech execution be incorporated into the high-level language of the computer in such a way that it will work well with the other I/O devices in real time and be easy to use.

Speech synthesis can be based on either a digitized waveform of the original speech or a parametric model representing the human vocal tract. Waveform representation may sound very good but it has the inherent disadvantage of operation at a high data rate—requiring more memory or producing few words. Parametric modeling requires less memory but involves more analysis to derive words.

PHONETIC SYNTHESIS

The speech hardware used with phonetic software ranges from a formant synthesizer implemented on a digital signal processing chip to a library of digitized phonetic sounds and a digital-to-analog converter. A phoneme synthesizer can be implemented entirely in the hardware—a good example is the Votrax speech chip. Phonetic synthesis can also be produced by an LPC synthesizer and a set of phoneme-length segments derived from actual speech. Both formant and LPC-type synthesizers are based on a parametric model of the vocal tract.

Phonetic synthesis uses a set of pre-defined phonetic sounds. Words are formed by concatenating the phonetic sounds according to a set of rules. The phonetic synthesis approach has two main features: 1) a low data rate—approximately 3 to 5 bytes per phoneme and up to 100 bytes per second to construct a word (most people verbalize one word in two-thirds of a second) and 2) verbalization of the words in a given language either through the use of phonetic spelling or a text-to-speech program using the given set of sounds and rules. The disadvantage of phonetic synthesis is that many of the qualities of the human voice we take for granted—emphasis, intonation, pitch—may be missing.

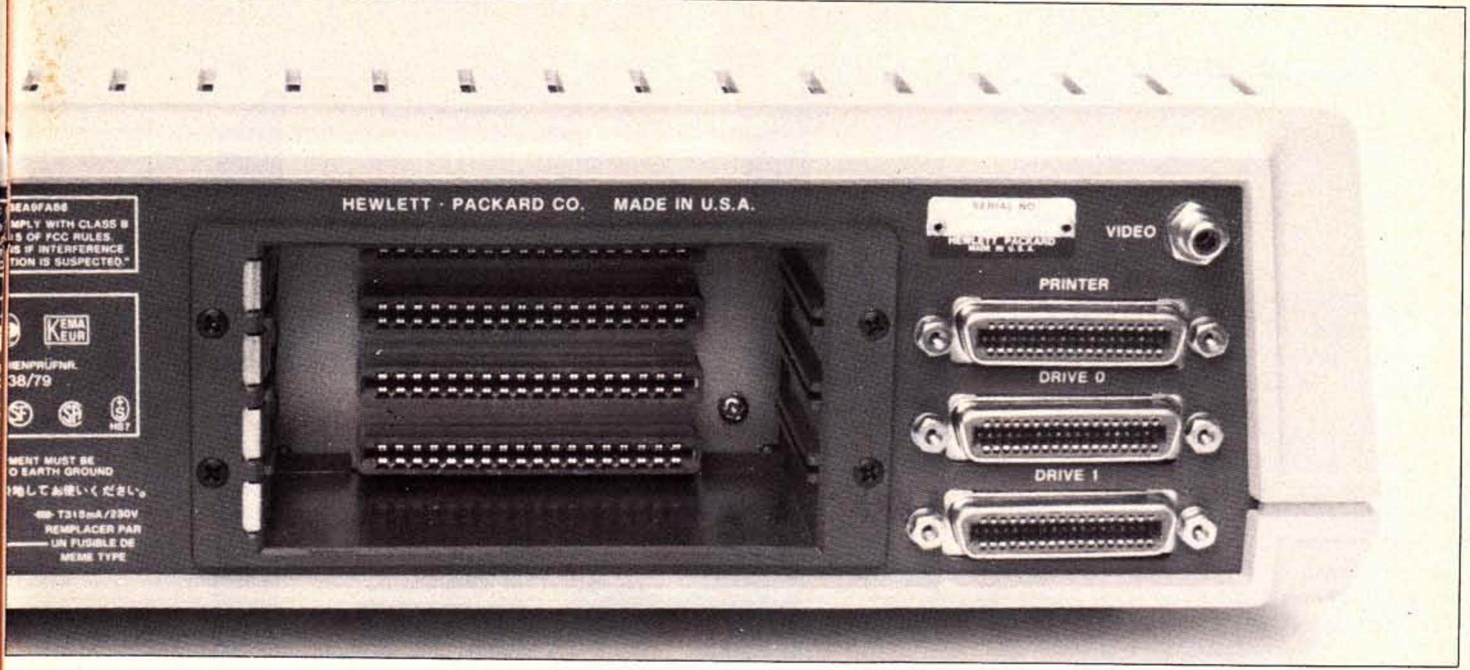


FIGURE 1. **Back view of HP Series 80 personal computer showing I/O ports where speech synthesis module is inserted.**

ANALYSIS/SYNTHESIS

Using this technique, a recording is made of a person speaking an utterance. An utterance is a human sound, a word, or multiple words spoken together, each one of which is analyzed. The recorded utterance is mathematically analyzed using the LPC technique. This yields information about the word in a condensed form, reducing one second of speech from 8,000 bytes to approximately 150 to 250 bytes. To synthesize the analyzed word, an appropriate speech chip must be used—for example, the Texas Instruments TMS 5220. The analysis/synthesis approach is important because it can produce speech of high quality and will work with multiple languages without altering the speech chip or analysis software.

Text-to-speech is a piece of software that works in conjunction with a speech synthesizer to convert a stream of ASCII words into synthesized words. Usually, text-to-speech is only associated with a phonetic synthesizer because of the large number of words required to make text-to-speech viable. Text-to-speech programs range in size from a few thousand bytes to more than 100,000 bytes, depending on the sophistication of the program and the phonetic rules set for generation and/or concatenation of the phonetic sounds.

HP 82967A SPEECH SYNTHESIS MODULE

The speech synthesis software/hardware approach we'll talk about is based on a new speech card for HP Series 80 personal computers.

The HP 82967A has four key elements:

1. Hardware
2. Speech Output
3. Vocabulary
4. Software
    a. Editors and binary programs
    b. Utilities

The new module is an LPC-type of speech synthesis system, based on the Texas Instruments TMS 5220 speech chip. Software plays a major role in making the module useful—even with the most elegant hardware in the world, a computer without the necessary software is useless.

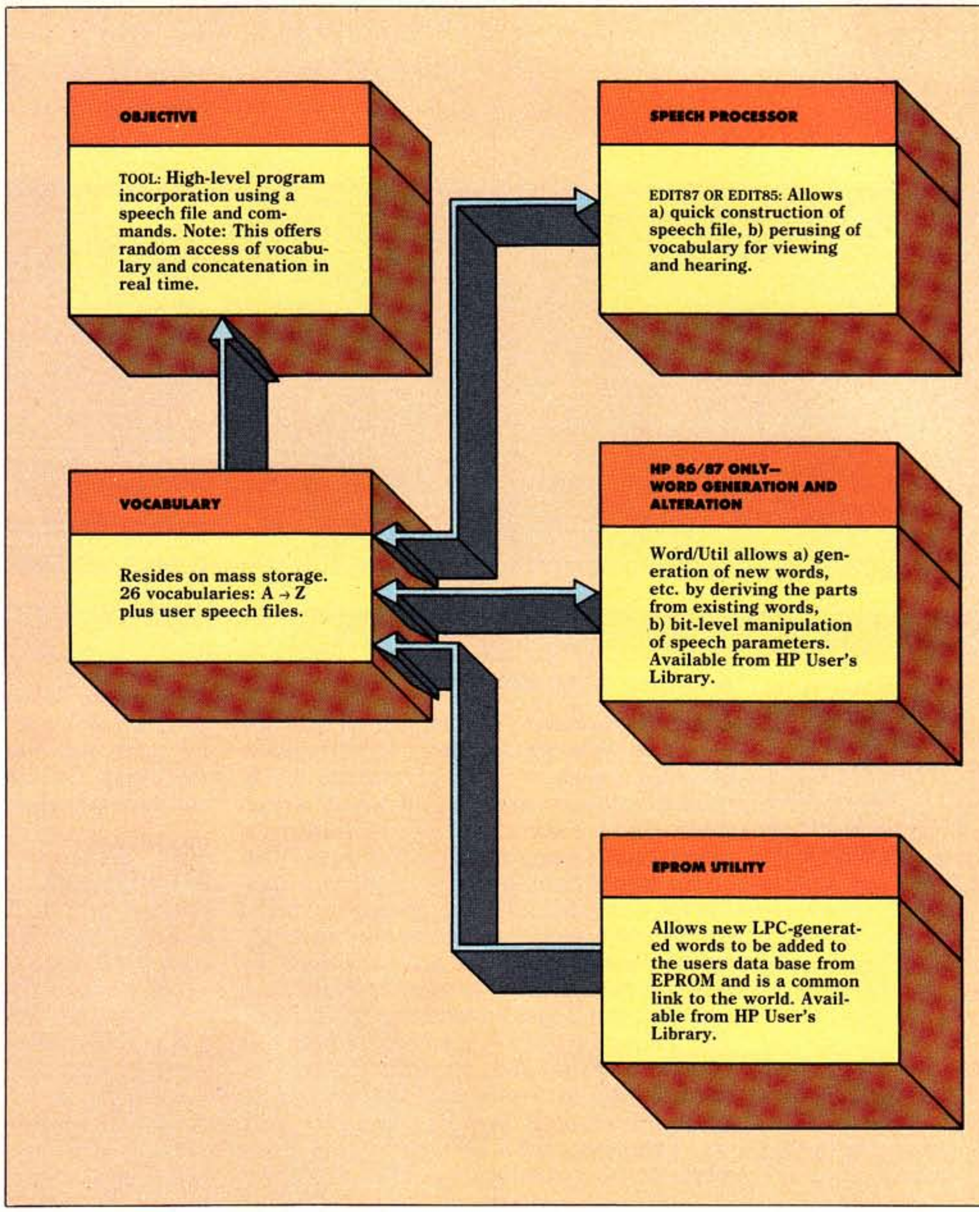
HARDWARE

The HP 82967A is an I/O module that plugs directly into the back of any HP Series 80 computer (see Figure 1). The module is fully enclosed in a plastic case for easy attachment to the computer.

When the computer wants a word to be verbalized, it outputs the LPC parameters associated with the word to a 90-byte FIFO contained in the RAM of an 8049 microprocessor on the speech card. The parameters reside in the FIFO until required by the TMS 5220 speech chip. The chip takes the speech parameters and generates an analog signal representing the desired word. The analog signal is in succession attenuated, filtered and amplified. (Attenuation is the process of reducing the analog signal level, allowing programmable software volume control of the speech output. Filtering to remove unwanted noise is done with high-pass and low-pass filters rolling off at 100 Hz and 3000 Hz, respectively.)

The speech card, with its manual volume control knob at the back, was designed to take advantage of the key attributes of the computer—memory, programmability, mass storage—without compromising quality, in order to keep the cost down.

There are two 8-ohm speaker jacks on the back of the card—an RCA-type jack and a ¼-inch phono jack. The output jacks may be used with a speaker or headphones but not both at the same time. Using the RCA jack you can easily connect the speech card to the internal speaker of the HP 86 monitor (see Figure 1). With the volume control turned down all the way, the volume level is set


OBJECTIVE

TOOL: High-level program incorporation using a speech file and commands. Note: This offers random access of vocabulary and concatenation in real time.

SPEECH PROCESSOR

EDIT87 OR EDIT85: Allows a) quick construction of speech file, b) perusing of vocabulary for viewing and hearing.

VOCABULARY

Resides on mass storage. 26 vocabularies: A → Z plus user speech files.

HP 86/87 ONLY— WORD GENERATION AND ALTERATION

Word/Util allows a) generation of new words, etc. by deriving the parts from existing words, b) bit-level manipulation of speech parameters. Available from HP User's Library.

EPROM UTILITY

Allows new LPC-generated words to be added to the users data base from EPROM and is a common link to the world. Available from HP User's Library.

FIGURE 2. **Block diagram of separate parts of software process.**

correctly for use with headphones.

As we've said, the speech module uses an LPC-type speech chip. When speaking a word, the speech chip requires a set of LPC parameters (binary numbers) to be fed to it every 25 milliseconds until the word is completed. (The LPC parameters are digital numbers that represent the characteristics of a word.) The parameters represent 1) energy, 2) pitch, 3) a repeat bit that tells the speech chip whether to reuse parameters it already has, and 4) a group of parameters called reflection coefficients that change the characteristics of the speech filter in the synthesizer over time.

It's worth noting that these parameters are, in most cases, mathematically derived from some original audio recording of the word or sound using an LPC-type analysis, the purpose of which is to reduce the amount of information required to represent the word or sound. This is the source of both the advantage and the disadvantage of LPC-type speech for end users: The advantage is that a good LPC analysis can produce splendid results. The disadvantage is the high cost of the hardware and software to do a good LPC analysis.

When whole words and/or phrases are produced with an LPC analysis, many of the important qualities of the original human utterance such as pitch, emphasis, and accent are preserved.

Next, we'll talk about the goal of the HP 82967A speech synthesizer software/hardware and work back to its separate processes (see Figure 2).

SPEECH OUTPUT AS A TOOL

Making speech on the personal computer a meaningful tool is accomplished by allowing easy incorporation of speech into the user's high-level language program while not sacrificing speech quality. Since speech synthesis on a computer is not an end in itself, but an enhancement, it requires very little additional effort to write the necessary program.

Three things are needed to incorporate speech into an HP BASIC language program:

Talking is probably the most natural means of communication, so a computer that talks is logical considering the growth of personal computer use.

1) a command to execute or speak the desired utterance or phrase; 2) a speech file that can be placed in the memory of the computer, containing the words, sentences or sounds you want to verbalize; and 3) a command that will select the parameters for the desired utterance or phrase from the speech file so that it in turn can be spoken.

In the programming example, a speech file was loaded from mass storage under the file name "WORDS." A speech file is a data file of vocabulary used in an application, whether the application is a warning system or a spelling-bee program. In essence it is a subset of your vocabulary data base. Using a speech file allows a minimum of computer memory to be used and reduces the transfer time required to move the data file from mass storage to RAM.

A speech file may consist of one phrase or a thousand phrases. A phrase can be whatever you want—a word, sentence or sound. It can even be the preamble to the Constitution.

The file may reside on a floppy disk, cassette tape (for the HP 85) or in EPROM, using an HP EPROM module.

VOCABULARY

The HP 82967A is shipped with a vocabulary on a disk of approximately 1,500 utterances composed of English words, variations and sounds. All the vocabulary, which has a common male voice, is broken into 26 vocabulary data files, A through Z, with all the A words residing in the A vocabulary data file, etc. The average utterance in the vocabulary requires 95 bytes of data. However, some utterances are much larger—a bugle call is the largest at 1,469 bytes.

Variations of some words are included to aid in sentence construction since people pronounce words differently and at different rates, depending on the preceding and following words in a sentence and what the speaker really wants to communicate. To denote variations of a word in the data base, each variation is followed by a number—for example, warning, warning1, warning2.

Prefix and suffix sounds are denoted by '—for example, the plural sound sss is denoted sss'.

Musical sounds are denoted by a right-hand parenthesis—for example, bugle call), whistle).

Speech data files have a unique structure to facilitate the handling of the words by a personal computer. Although the user doesn't need to understand the data file structure to utilize speech, the file structure is described for completeness.

When a speech data file is generated, the first ASCII string stored in the data file contains information regarding all the words in the data file; this string is called the name string. The information for each phrase includes the name length, the number of concatenations in the phrase, the relative location in the data file of the speech data with respect to the other

The following example demonstrates programming with speech in HP Basic:

```
10 Dim A$[1000],P$[2000]
20 LOADBIN "SPKB87" ! load a binary program that contains the
30                  ! speech commands
40 !
50 ! next we will load a speech file
60 !
70 ASSIGN#1 TO "WORDS" ! WORDS - name of speech file
80 DLOAD#1;A$,P$       ! ASCII goes into A$ & data into P$
90 ASSIGN#1 TO *       ! close the mass storage data file
100 !
110 ! Let's set the volume from the keyboard
120  SVOL 10;15 ! 10 is the speech card address & 15 is the
                    maximum volume setting
130 !
140 ! now we are ready to pick 2 phrases and speak them
150 ! sequentially
160 SPEAK 10;PAR$("CONGRATULATIONS",A$,P$)&PAR$("ACE",A$,P$)
170 !
180 ! or you could do it as follows
190 !
200 S$="CONGRATULATIONS"
210 Q$="ACE"
220 R$=PAR$(S$,A$,P$)&PAR$(Q$,A$,P$)  !(locate the required
221 !                                   speech data using an
222 !                                   ASCII name in a string
223 !                                   variable)
230 SPEAK 10;R$ ! speak the words - 10 is the address the speech
240 !                               card resides at
250 !
260 ! CONTINUE WITH YOUR PROGRAM
```

When whole words and phrases are produced with an LPC analysis, many of the important qualities of the original human utterance are preserved.

phrases, a search tag and the phrase name. The first two bytes of each set of speech data parameters give the length in bytes of that set of parameters (see Figure 3).

The vocabulary disk is initialized with 25-byte record boundaries to minimize wasted space on the disk. After the ASCII name string is placed on the disk, the speech data for each phrase in the data file is stored out as a string, always starting on the next available record boundary. When speech data for a phrase is wanted from the disk, the ASCII name string is searched to find the placement of the speech data for the phrase within the data file.

The routines necessary to store and read from the speech data files are contained in the EDIT87 and EDIT85 programs shipped with the speech card. The routines are written in BASIC. When the EDIT87 or EDIT85 programs are being run, the program may be paused and A$ (ASCII information string) or P$ (speech data) dumped on the screen for observation.

SOFTWARE

A speech editor called EDIT for both the HP 86/87 and the HP 85/83 is shipped on the vocabulary disk (see Figure 4). The HP 86/87 editor is called EDIT87; the HP 83/85 editor is EDIT85.

The first thing a person likes to do after buying a speech card is hear it talk. Do this by loading EDIT87 or EDIT85 and pushing the run key. You can then make the computer talk to your heart's content.

EDIT is a program that allows you to peruse the vocabulary data base, selectively viewing and listening. It permits you to compose a data file, referred to as a speech file, consisting of the sentences, words and sounds you want to use in your applications program. EDIT assists a user in composing a speech file in much the same way as a word processor assists in writing text. Therefore, it's useful to think of EDIT as a speech processor.

Here's the softkey menu for the major functions of EDIT.

VIEW—allows viewing of names in a data file or all data files.

LISTEN—allows the selection of a word or words concatenated into a sentence for listening. For example,

HELLO_ACE_THIS_IS_COMPUTER_
SPEECH SYNTHESIS.

The underline is typed in after each desired phrase. The name SPEECH SYNTHESIS is one phrase. To add pauses between the phrases, add more underlines. You can use LISTEN to hear vocabulary in your data base on mass storage and EDIT for vocabulary in RAM.

GET—allows you to get a whole vocabulary file and place it in the editor for alteration, addition, etc.

INCLUDE—allows you to pull selected phrases—whether they are words, sentences or sounds—into the editor from the mass storage device.

SAVE—allows you to store all words, sentences and sounds in the editor on a mass storage device. The saved file is your speech file, used in your applications program.

DELETE—allows deletion of phrases from the editor.

RENAME—allows changing of the name(s) associated with the words, sounds and phrases. For example, "HELLO HEWLETT PACKARD" could be renamed "GREETING."

There are various techniques for phrase construction.

Word Selection: Note that many words in the data base have existing variations in pronunciation. Using the correct variation of each word in phrase construction is the most important consideration in producing good quality speech. The additional time required to listen to each variation until the correct fit is selected is a good investment. Listening time is minimized by adding the variations of the words into memory from the vocabulary disk and listening to the concatenated words from RAM instead of the disk.

Renaming: Names associated with words can be numeric as well as alphabetic. This is sometimes useful for incorporation of speech into a basic program. A simple example is verbalizing numbers:

Name of word: 60
Synthetic word: "sixty"

File Order and Sort: Sometimes it is desirable to place the existing sequence of phrases in a speech data file in alphabetic order. The EDIT programs will do a sort for you as an option—when you do a GET of a whole data file from disk—by typing in the desired "dictionary name" followed by ",S".

Example: "WORD,S"
where WORD is the file name.

Vocabulary Listing: Nobody wants to waste time trying to figure out how much vocabulary is available in a data base. The following resources eliminate guesswork:

1. The manual has a listing of every word and its byte count.
2. The manual also contains a tearout

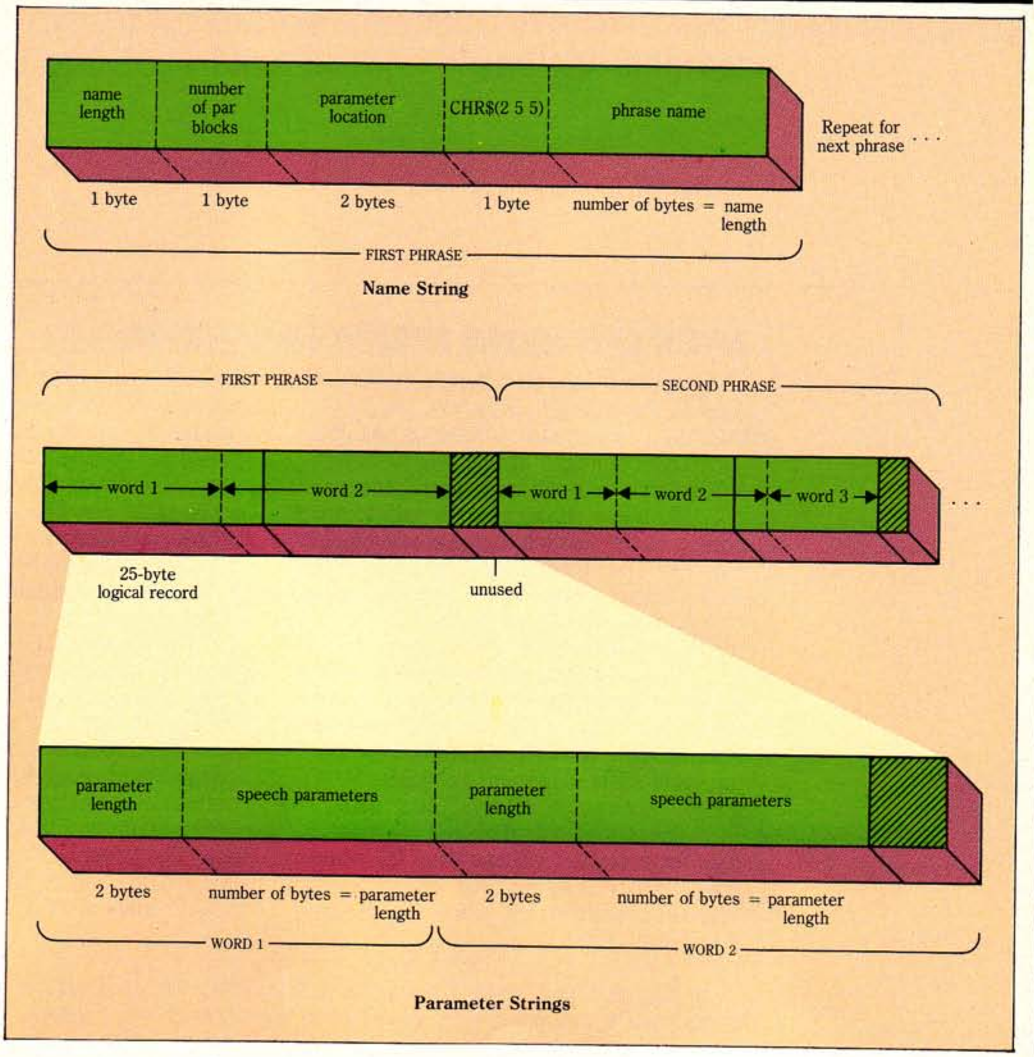

name length
number of par blocks
parameter location
CHR$(2 5 5)
phrase name
Repeat for next phrase . . .
1 byte
1 byte
2 bytes
1 byte
number of bytes = name length
FIRST PHRASE
Name String
FIRST PHRASE
SECOND PHRASE
word 1
word 2
word 1
word 2
word 3
. . .
25-byte logical record
unused
parameter length
speech parameters
parameter length
speech parameters
2 bytes
number of bytes = parameter length
2 bytes
number of bytes = parameter length
WORD 1
WORD 2
Parameter Strings

FIGURE 3. **Structure of a speech parameter string.**

card listing all 1,530 words in the data base provided (see speech vocabulary table).

3. Using the EDIT87 or EDIT85 programs you may view the existing names of any or all speech data files. You can also print out the listing that appears on the screen.

4. If all else fails, the EDIT program will tell you that the non-existent word you are trying to use is missing.

Speech synthesis is useful as long as the words you want are in the vocabulary data base. But what if you want to say "Thomas Edison" or "California" and they're not in the vocabulary?

Word/Util is a program that allows you to create words and sounds you need but don't have. It was written for use on the HP 86 and HP 87 only. The program is softkey-driven, with binary programs totaling over 28K bytes and several BASIC subprograms.

When you want to create a word, you extract the parts of the word from the existing vocabulary data base of words and patch them together. The resulting word will probably meet your expectations for quality. The process of generating a word takes just a few minutes in many cases, thanks to a friendly and very powerful user interface. To quickly locate the words you want to use, Word/Util will dump any existing vocabulary data file catalog on the screen in an orderly fashion.

It's worth noting about the process of word generation that the original vocabulary data base is large enough to yield the required sounds, so that almost any word you can think of can be generated. Since the entire data base has only one speaker, the quality of the newly generated word is much better than if the parts of the word had been derived from several different speakers.

Word generation by patching groups of sounds together is not unique. The phonetic synthesis approach of some popular speech systems on the market allows you to misspell a word or spell it phonetically to derive the correct pronunciation. What is really occurring is the concatenation of phonetic sounds to generate the desired word.

There are three distinctions between Word/Util and strict phonetic word generation systems:

1. Word/Util allows the user generating a word to select the parts of the new word in as complete a form as possible. Instead of thinking in terms of phonetic parts, much of the time the user can think in terms of syllables.

2. The ability to work at the syllable level when constructing a new word can be faster than at the phonetic level.

3. The results sound better.

BASIC LANGUAGE SPEECH COMMANDS

The following speech commands were used in the example program:

`DLOAD    example DLOAD#1;A$,P$`

This command allows you to bring in a speech data file from mass storage. DLOAD takes all the speech data for each phrase in the speech data file and places it in P$. The information contained in the ASCII name string—word location, name length, etc.—is placed in A$.

`SVOL     example SVOL 10;15`

This command allows the BASIC language program to adjust the speech volume to any one of sixteen possible levels ranging from 0 to 15, where 0 is no volume and 15 is maximum volume.

`PAR$  example PAR$("ACE",A$,P$)`

This command retrieves the speech data for a desired phrase from P$ when given an ASCII name (line 160) or a string variable containing the same ASCII name (line 220), as long as the phrase is in your speech file. Remember, P$ contains all the speech data for all the phrases in your speech file and A$ contains the ASCII name information. Par$ uses A$ as a lookup table into P$.

`SPEAK    example SPEAK 10;R$`

This command feeds the speech data to the speech card and tells the card to invoke speech.

The number 10 is the I/O address given to the speech card as a factory setting. If this address needs to be changed, it can be done by flipping a switch on the card.

These functions could have been accomplished using BASIC language subroutines and existing commands, with the disadvantage of a less friendly user interface. The speech commands are part of the SPKB87 and SPKB85 binaries used on the HP 86/87 and HP 85/83, respectively.

If the resulting word doesn't have the characteristics you want, or if you want to do something really exotic, Word/Util will allow you to quickly manipulate, add or delete LPC parameters the utterance is composed of.

Word/Util has been called an "experimenter's dream" by its writers. It's available from the HP personal computer user's library at a nominal cost.

Speech parameters generated for the TMS 5220 speech chip should look identical for any unique utterance whether the speech chip is in a Hewlett Packard product or a Texas Instruments product. However, the way the speech parameters are handled and stored in their respective systems will most likely be entirely different.

Custom LPC-analysis word generation is available from different design support organizations such as Texas Instruments Regional Technology Centers around the world. Equipment that will allow users to do custom LPC-analysis word generation is slowly becoming available.

The most common medium to send and receive speech parameters on is an EPROM, unless you are dealing with hundreds of words. In the case of the HP 82967A speech synthesis module discussed here, receiving an EPROM containing the speech parameters is not enough. The speech parameters must be put into the correct data file structure.

To establish a friendly link between the data file structure and the EPROM containing speech parameters, an EPROM utility was written. The utility is easy to use. All you need is an HP personal computer system, the EPROM and an EPROM module made for the HP Series 80 personal computer line.

The user inserts the EPROM into the card and the card into the back of the computer, loads the EPROM utility software, then supplies a little information to the program (when prompted) about the names of the words in the EPROM and the starting addresses within the EPROM. This information should be supplied with the EPROM containing the words. The new words are placed in mass storage by the utility and are ready to be used.

The most common reasons for generating new LPC words are 1) for a foreign language; 2) for a different voice—for example, a female voice—or a special sound such as the chimes of a grandfather clock; and 3) for multiple words such as "the weather for today." (The speech resulting from multiple-word generation sounds like a recording.)

The HP 82967A was designed as a tool with both local and remote applications. Like any tool, getting the most from it requires time and attention; however, the results more than justify the user's efforts.

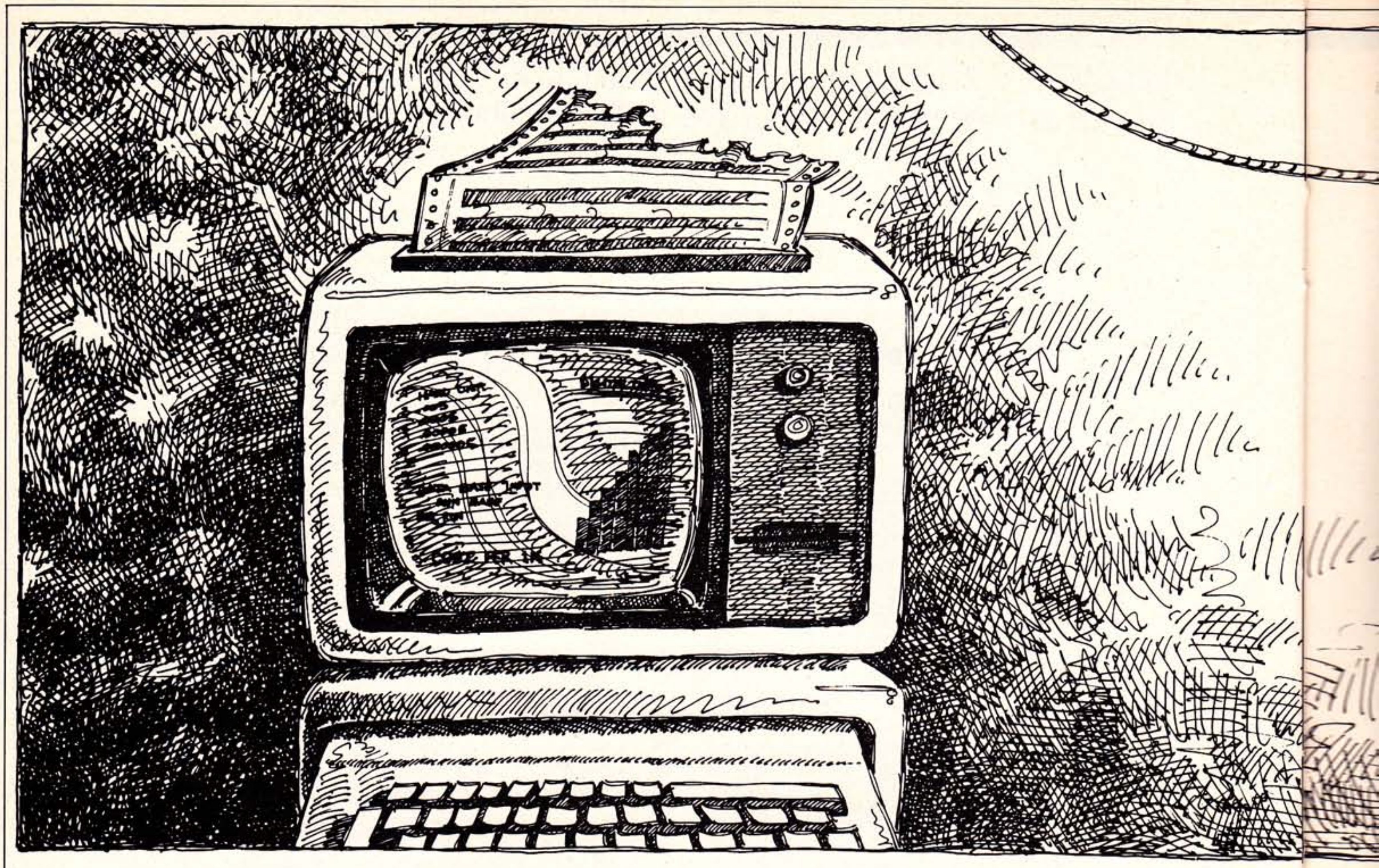
Loren Koehler is an R&D engineer at HP's Portable Computer Division, Corvallis, OR.

Word/Util is a program for the HP 86 and 87 that lets you create words and sounds you need but don't have in the vocabulary data base.

SPEECH VOCABULARY

The tear-out card in the manual contains a list of the vocabulary supplied with the HP 82967A Speech Synthesis Module (partial list shown here). All the words must be entered exactly as shown. Sound effects are denoted by words ending in a closing parenthesis); prefixes and suffixes end in an apostrophe '. Three of the words generate pauses: PAUSE1 (.1 second), PAUSE2 (.2 second) and PAUSE10 (1 second).

A
A1
A2
A3
A.M.
A.M.1.
ABEAM
ABORT
ABORT1
ABOUT
ABOVE
AC
ACCELERATED
ACCEPT
ACCEPT1
ACCEPTED
ACCEPTED1
ACCESS
ACCESSING
ACCOUNT
ACCOUNT1
ACE
ACES
ACKNOWLEDGE
ACTION
ADD
ADDRESS
ADJUST
ADSORBER
ADVISE
AERIAL
AFFIRMATIVE
AFTER
AFTERNOON
AGAIN
AGAIN1
AHEAD
AIR
AIR1
AIR BRAKES
AIRCRAFT
AIRPORT
AIRSPEED
ALARM
ASSOCIATED
ASTERISK
AT
AT1
ATIS
ATTACK
ATTENTION
ATTENTION1
AUGUST
AUTHORIZATION
AUTHORIZATION1
AUTO
AUTOMATIC
AUTOMATIC1
AUTOMATICALLY
AUXILIARY
AVAILABLE
AVAILABLE1
B
B1
BACK
BAD
BALANCE
BALL
BALL BEING CAUGHT)
BAND
BANDIT
BANK
BANK1
BASE
BASE1
BASKET
BAT HITTING BALL)
BATTLE
BEEN
BEFORE
ALERT
ALERT1
ALERT2
ALERT3
ALIEN
ALL
ALL1
ALL2
ALOFT
ALPHA
ALTERNATE
ALTIMETER
ALTITUDE
AM
AMERICAN EXPRESS
AMOUNT
AMOUNT1
AMPS
AN
AN1
AND
AND1
AND2
AND3
ANSWER
ANSWERED
ANTE UP
APPOINTMENT
APPROACH
APPROACHES
APPROVED
APRIL
APU
ARE
AREA
AREA1
ARRIVAL
AS
AS1
ASKED
BEGIN
BEHIND
BEING
BELL
BELOW
BET
BETWEEN
BID
BIG
BIRTH
BLIND
BLOCKED
BLOWING
BONUS
BOOKLET
BOOST
BOTH
BOTTOM
BOX
BRAKE
BRAKING
BRAVO
BREAK
BROKEN
BUFFER
BUGLE CALL)
BUILD
BUS
BUSINESS
BUSINESS1
BUSY
BUSY1
BUT
BUTTON
BUTTON1
BUTTON2
BY
C
C1
C2
CABIN
CALENDAR
CALIBRATE
CALL
CALL1
CALL2
CALL3
CALL4
CALL5
CALL6
CALL7
CALL8
CALL9
CALLING
CALM
CAN
CANCEL
CANCEL1
CANCEL2
CANCELLED
CANNOT
CAPACITANCE
CAR
CARD
CARD NUMBER
CARDHOLDER
CARDS
CARTE BLANCHE
CASING
CAUTION
CAUTION1
CEILING
CELSIUS
CENT
CENT1
CENTER
CENTER1
CENTI
CENTS
CENTS1
CHANGE
CHANGED
CHARLIE
CHARLIE1
CHECK
CHECK1
CHECK2
CHIME1)
CHIME2)
CHOICE
CIRCUIT
CLEAN
CLEAR
CLEAR1
CLERANCE
CLEARANCE DELIVERY
CLIMB
CLOCK
CLOCK1
CLOSE
CLOSED
CLOSED1
CODE
CODE1
COIN
COIN1
COLD
COLLECT
COLLECT1
COME
COMMAND
COMPANY
COMPLETE
COMPLETE1
COMPONENT
COMPUTER
CONDUCTIVITY
CONFERENCE
CONGRATULATIONS
CONGRATULATIONS1
CONNECT
CONTACT
CONTAMINATED
CONTINUE
CONTROL
CONTROL 1
CONVERGING
COPY
CORRECT
COUNT
COURSE
COURT
COWL
CRANE
CRANE1
CREASE
CREDIT
CROSS
CROSSWIND
CROWD NOISE)
CRYSTALS
CURRENT
CUSTOMER
CYCLE
CYCLE1
CYLINDER



DATA

Effective computer security protects with minimum interference to normal operations and minimum interference to the user.

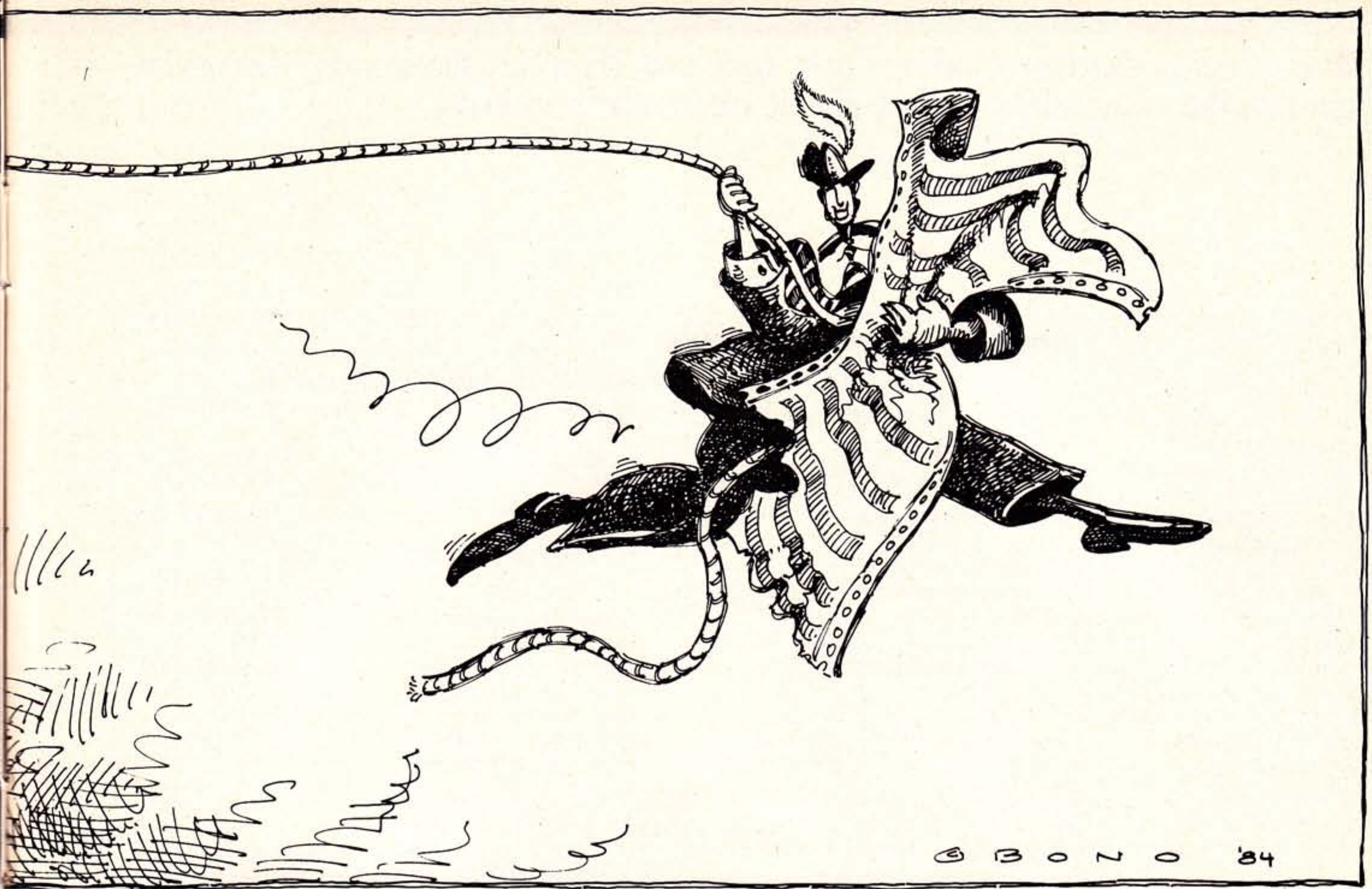
This is the first in a series of articles discussing computer security, and identifies basic hardware and software vulnerabilities. Next: How to anticipate and neutralize the threats.

- After installing a microcomputer, a manager notified one of his employees that her employment would be terminated the following Friday. When the manager arrived the Monday morning after, he found that every floppy disk had been neatly cut in half. The manager was ignorant of a basic security rule: Any employee notified of terminated employment should immediately be denied access to the computer and related files.
- The owner of a fuel oil firm set up a microcomputer in the corner of his office. A truck, motor idling, was parked just outside while the driver made a pickup inside. Later it was discovered that the information stored on the computer's disks had been destroyed. No one was aware of the damaging emissions generated by "noisy" electrical systems in trucks and cars.
- A doctor with a microcomputer in his office was told by his dealer that he could plug the machine into any electrical outlet. While his office assistant was updating patient records and making a backup copy, the doctor used the x-ray machine. The microcomputer was instantly "zapped," and the two disks in the machine were ruined. The doctor was never told about the dangers of using x-ray equipment around computers, and was never told that a single backup disk is insufficient.

You won't find these vignettes in the popular press, which has recently relished exposing more sensational computer security problems. These are problems that users of microcomputers encounter every day and illustrate that microcomputer security is as difficult, if not more so, to implement than mainframe protection.

In planning and implementing microcomputer security, it is necessary to minimize the probability of loss or breach in security and to minimize the damage resulting in either instance. Effective security provides the nec-

ILLUSTRATIONS BY PETER BONO



HIGHWAYMEN

BY HAROLD J. HIGHLAND AND ESTHER H. HIGHLAND

essary protection with minimum interference with normal operations and minimum inconvenience to the user.

Security should be designed to:

- minimize interruptions to data processing caused by electrical power irregularities and interruptions;
- protect hardware from theft;
- reduce the risks of fire, smoke and water damage;
- provide a safe operating environment, which avoids destruction, accidental or otherwise, of data files;
- reduce employee error;
- stop authorized or unauthorized system access to obtain copies of information, to modify data already stored in the system, or to make illegal entries into data files;
- meet computing needs if the system fails and cannot be repaired within a reasonable time;
- provide auditability by monitoring operations and discriminating between normal and abnormal computer operations, thus detecting breaches in computer security.

Many professionals and owners of small businesses install computers with little knowledge of how they work and with the unfounded belief that everything on a computer printout is correct and should be relied upon. The computer, it is true, does not lie. But the computer and data are subject to manipulation.

Because almost all users of microcomputers are new to the computer field and have never been involved in the management of a computer center, they are unaware of computer security. Furthermore, microcomputers do not have many of the built-in security features that large mainframes have. The first step in computer security is to recognize that the problem exists and after some analysis determine what action is necessary and cost-effective.

Few microcomputer users can be classified with big corporations and banks from which millions of dollars are stolen by fraudulent means using computers. Stealing half a million dollars from a bank by manipulating computer software and data can make headlines, but stealing a thousand dollars from a

Some digital electronic crimes now take less than 3 milliseconds. And even geographic constraints cannot inhibit electronic criminals.

ANALYSIS OF COMPUTER ABUSE CASES

Only a small portion of computer-related crimes and cases of computer abuse are actually reported. The U.S. Department of Justice in a recent study reports the following:

TYPE OF COMPUTER ABUSE	PERCENT OF TOTAL	AVERAGE DOLLAR LOSS
Physical destruction	14%	$836,000.00
Intellectual property [data and programs] stolen	28%	$3,322,000.00
Financial manipulation	42%	$1,462,000.00
Unauthorized use of computer services	15%	$32,000.00

small business in the same way will undoubtedly be ignored by the news media. Yet that half million is 1 percent of a bank with a $50 million volume; $5,000 from a company with a half million dollar volume is also 1 percent and is just as important to that company.

Computers have engendered a new type of crime. Traditional categories of criminals now include computer programmers, computer operators and tape librarians. Not only are criminal methods new, but a whole new jargon has developed to identify automated criminal methods. The names given to such methods tend to make them sound adventurous and romantic rather than criminal. Adding to the problem is that many of these criminals see themselves as only defrauding an impersonal organization rather than individuals. In one case, the criminal said that he never took more than $20,000 from a single bank account because he knew the accounts were insured up to that amount and "no one" would suffer. This attitude has even been given a name: The Robin Hood Syndrome.

Electronic money (as well as paper and plastic money, or credit cards) are now assets subject to theft. Accounts—in the form of electronic signals and magnetic patterns—are stored and processed by computers. Amounts of money are electronically debited and credited inside computers. In fact, networked computers are rapidly becoming a vast electronic vault for the business community. Many other physical assets, including inventories of prod-

WHAT THREATS DO YOU FACE?

Just as an illustration, try putting a price tag on:

- the loss of a list of active customers, including names, addresses and the record of purchases over the last five years;
- the destruction of an accounts receivable file that has been kept on the computer for the past year;
- the disclosure of a patient's or employee's medical history and record to an unauthorized source, such as an insurance company;
- an entry clerk's modification of an order so that the customer receives the number of units ordered but is billed for only half the amount;
- an electrical power surge destroying the microcomputer's power supply system that will take at least one week to replace;
- having an employee playing a computer game periodically during the day on a system that is being used near its capacity level.

ucts in warehouses and of materials moving in and out of factories are represented by digital signals in computer memories.

The timing of crimes may also change. Traditionally, criminal acts are measured in minutes, hours, days, weeks, months, etc. Some electronic crimes now take less than 3 milliseconds. Geographic constraints cannot even inhibit electronic criminals.

NEW NAMES FOR NEW CRIMES

Computer-related crime and computer-abuse methods have been defined and given names in many studies and articles intended for the professional reader. Although described briefly here, not all are applicable to microcomputers or networks in a small business. They serve, however, to familiarize the terms commonly used and to indicate the extent and variety of possibilities that must be considered in making a system secure.

1. DATA DIDDLING. This is the simplest, safest and most common method used in computer-related crime, and any size business with any computer system is vulnerable. It involves changing data before or during input by anyone associated with, or having access to, the processes of creating, recording, transporting, encoding, examining, checking, converting or transforming data.

A typical example is the case of a timekeeping clerk who regularly filled out data forms for hours worked by 300 employees. He noticed that all data forms were entered into the computer with the employee's name and number, but the computer only used the number. He also noticed that manual controls outside the computer used only the employee's name, since no one thought of the people as numbers. He therefore entered overtime hours for employees who frequently worked overtime but used his own number for the computer. He thus increased his annual earnings by several thousand dollars until an auditor noticed unusually high earnings for a clerk.

2. TROJAN HORSE. This is the covert placement of computer instructions in a program so that the computer will perform an unauthorized function but usually will still allow the program to perform its intended purpose. This is the most common method in computer program-based frauds and sabotage but requires more technical knowledge than data diddling. A programmer could, for example, instruct the computer to place the names of all new customers in a special, unauthorized file whenever it lists the name in the legitimate file. He would thus acquire a potentially valuable list of names without anyone knowing the instruction was there.

3. SALAMI TECHNIQUES. An automated form of crime involving the theft of small amounts of assets from a large number of sources is identified by this picturesque name, which means taking small slices without noticeably reducing the whole. It is not applicable to small businesses lacking a sufficient number of accounts. An illustration is a banking system in which a program could be changed (using a Trojan Horse method) to randomly reduce a few hundred accounts by 10 or 15 cents and to transfer the money to a favored account where it could be withdrawn by normal methods.

4. SUPERZAPPING. This method got its name from Superzap, a macro/utility program used in most IBM computer centers. Computers sometimes stop, malfunction or, for other reasons, need attention that normal access methods do not allow. In such cases, a universal access program is needed. This program is the master key to the system, a powerful and potentially dangerous tool if not kept secure from unauthorized use.

A classic example of superzapping resulted in a $128,000 loss in a New Jersey bank. The manager of computer operations was using a superzap program when he discovered

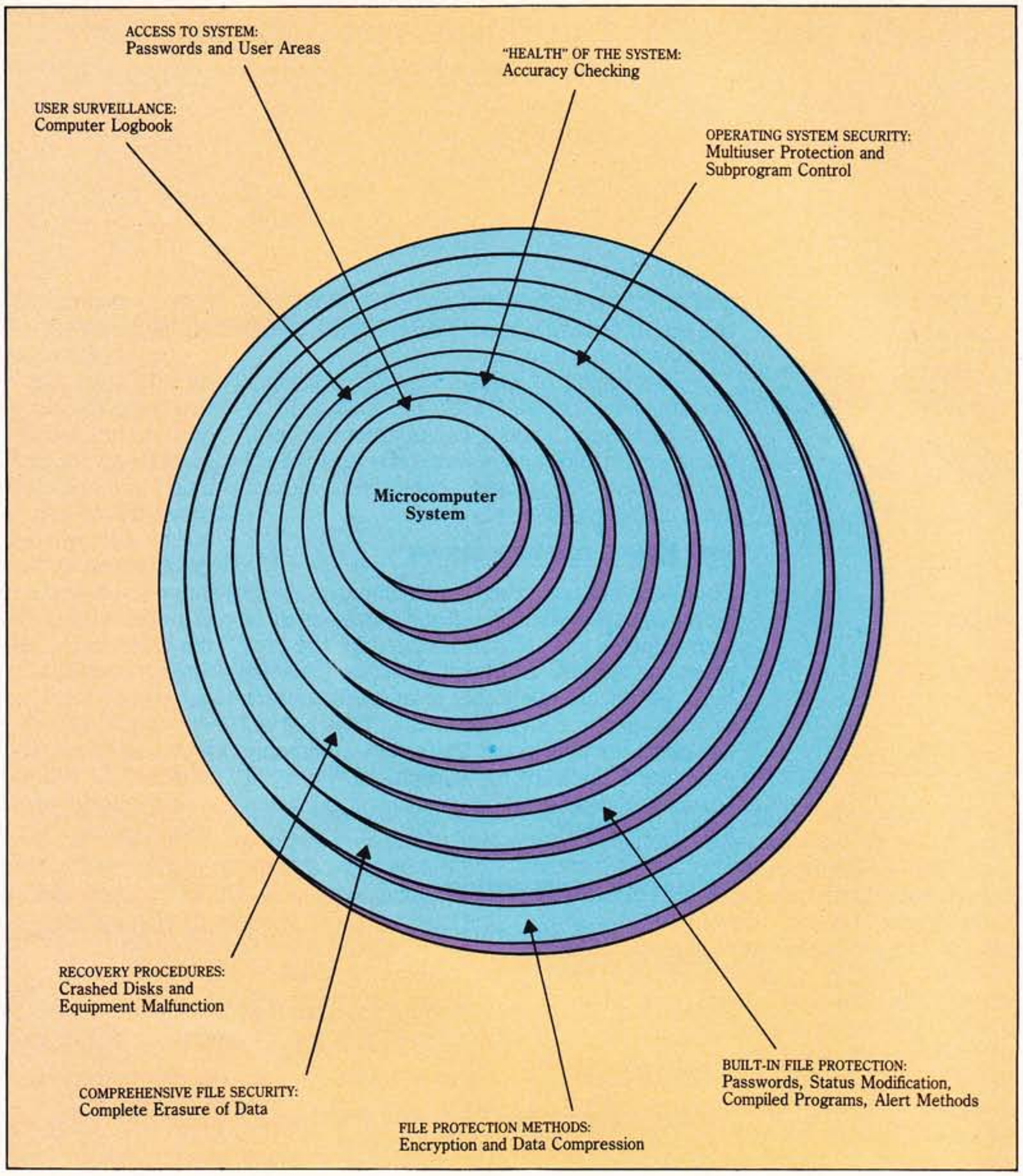
A MATTER OF DEFINITION

The U.S. Department of Justice provides the following definitions in the area of computer crime:

COMPUTER ABUSE: Any incident associated with computer technology in which a victim suffered or could have suffered loss and a perpetrator by intention made or could have made gain.

COMPUTER-RELATED CRIME: Any illegal act for which knowledge of computer technology is essential for successful prosecution.

DATA LEAKAGE: Unauthorized, covert removal or obtaining copies of data from a computer system. This is a deliberate act, whereas in data seepage the removal of data is accidental.


ACCESS TO SYSTEM:
Passwords and User Areas
"HEALTH" OF THE SYSTEM:
Accuracy Checking
USER SURVEILLANCE:
Computer Logbook
OPERATING SYSTEM SECURITY:
Multiuser Protection and
Subprogram Control
Microcomputer
System
RECOVERY PROCEDURES:
Crashed Disks and
Equipment Malfunction
BUILT-IN FILE PROTECTION:
Passwords, Status Modification,
Compiled Programs, Alert Methods
COMPREHENSIVE FILE SECURITY:
Complete Erasure of Data
FILE PROTECTION METHODS:
Encryption and Data Compression

SOFTWARE SECURITY **can be thought of as layers of protection, each layer adding to the value of those already in place. Techniques shown here are arranged, from the inside out, by increasing cost and sophistication, starting with access control and ending with data compression and encryption.**

how easy it was to make changes without the usual controls or journal records. He made changes transferring money to the accounts of three friends and continued long enough for a customer to find a shortage.

5. TRAPDOORS. These are usually intentional points of entry into a large application or operating system program intended to allow access to the program during debugging, modification or restart procedures. However, trapdoors may also be introduced inadvertently through a weakness in design logic or in the electronic circuitry of the computer. When included intentionally for debugging, trapdoors are normally eliminated in the final editing, but are sometimes overlooked. During the use and maintenance of computer programs and circuitry, ingenious programmers invariably discover some of these weaknesses and take advantage of them for either useful or malicious purposes.

In one computer-related crime, several automotive engineers in Detroit discovered a trapdoor in a commercial timesharing service in Florida allowing them to search uninhibitedly for privileged passwords. They discovered the password of the president of the timesharing company and were able to obtain copies of trade-secret computer programs, which they then used free of charge.

6. LOGIC BOMBS. This method has also been called a Time Bomb; logic bomb because it is code inserted into a program (a Trojan Horse) and time bomb because the code is only executed at a specific time or under specific conditions. In one case, a payroll system programmer put a logic bomb in the personnel file so that if his name were ever removed from the personnel file, indicating termination of employment, the secret code would have caused the entire personnel file to be erased.

7. SCAVENGING. This is a method of obtaining information that may be left in or around a computer after the job is finished. Simple physical scavenging could be the searching of trash barrels for copies of discarded computer listings or carbon copies or even the carbon paper from multi-part forms. More technical methods may involve searching for residual data left in a computer after job execution.

There appears to be little difference between modern, amateur white-collar criminals who use computers and those who do not.

For example, a computer operating system may not erase buffer storage areas used for the temporary storage of input or output data. Some do not erase magnetic disk or magnetic tape storage media because it requires too much computer time. New data is simply written over old data. It may be possible, therefore, to read the old data before it is replaced by new data.

One case of industrial espionage was detected by an alert computer operator in a time-sharing service that had a number of oil companies as customers. He noticed that a particular customer always "read" from a temporary storage tape before "writing" on it, and he reported the fact to management. The customer was obtaining seismic data stored by various oil companies on the temporary tapes and selling this highly proprietary, valuable data to other oil companies.

8. BROWSING. Similar to scavenging, this hunt for information is a search through storage for something of interest or potential value. The browser does not necessarily know that anything of value is there or in what form it is stored. He/she uses legitimate access to part of the system to access unauthorized files.

9. DATA LEAKAGE. A wide range of computer-related crime involves the removal of data or copies of data from a computer system or facility. There is considerable danger to the criminal because, although his technical act may be well hidden in the computer, he must get the data from the system in order to convert it to economic gain.

Several techniques have been used to leak a computer's sensitive data, which can be hidden in otherwise innocuous looking reports. Many of the other methods of leaking data are rather exotic and might be used only in high-security, high-risk environments.

10. PIGGYBACKING. There are two kinds: physical and electronic. Physical piggybacking can be illustrated by an individual with his hands full of computer-related objects, such as tape reels, standing by a locked door until someone authorized to enter comes along. Though unauthorized to enter, the second individual goes in with his authorized counterpart.

Electronic piggybacking can occur in an on-line system where individuals use terminals, and identification of a terminal is automatically verified by the computer system. Compromise of the verification system occurs when an unauthorized terminal is connected to the same line as a legitimate terminal through telephone switching equipment and used when the legitimate user is not using his terminal. The computer does not differentiate between the two terminals.

11. IMPERSONATION. Also called masquerading, this process allows one person to assume the identity of another. An electronic impersonation involves claiming the identity of an unauthorized user after obtaining passwords or other authorization credentials through wiretapping or other means.

THE CRIMINAL ELEMENT

It is often said that most computer-related crime goes undetected or unreported, but based on a survey of criminals caught and tried, a set of characteristics has been identified. These are, of course, not conclusive or complete because of the small number of people included, and there appears to be little difference between modern, amateur, white-collar criminals who do not use computers and those who do:

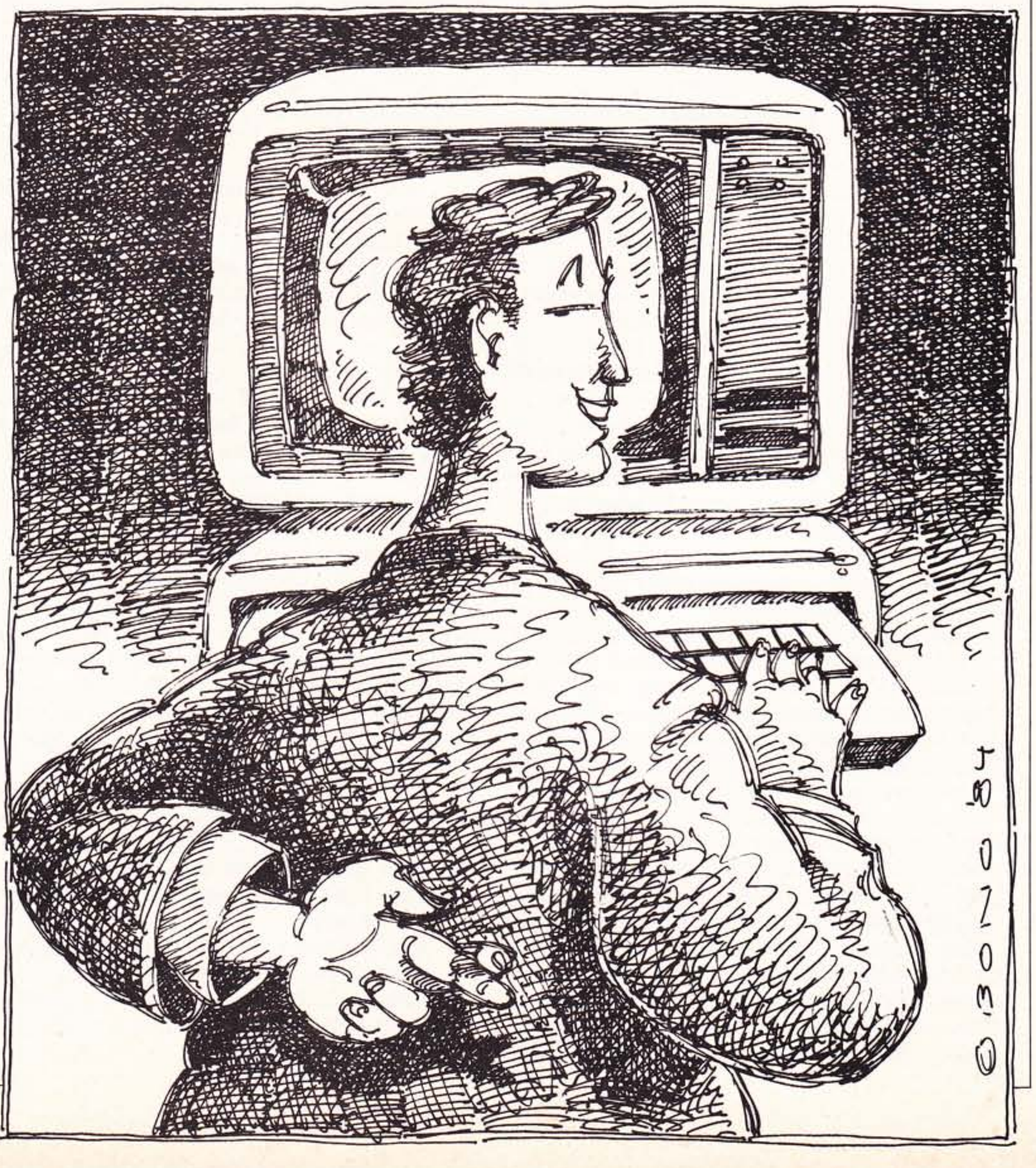
- They tend to be young—the median age is 25 years—ranging from 18 to 46 in the group surveyed. Younger people in data processing occupations often are educated in colleges and universities where attacking campus computer systems is not only condoned but often encouraged as an educational activity.
- They are among the most skilled and knowledgeable technologists. One of the greatest risks comes from employees who are overqualified and easily bored.
- They frequently hold positions of trust, giving them easy access to the system; they perform their criminal acts while apparently doing their own work. Among the occupations in the survey group are an accountant, systems programmer, systems manager, sales manager and company president.
- Collusion is more frequent in computer-related crimes than in other types of white-collar crimes. Collusion usually involves a computer specialist who can perform the technical part of the act and another individual at the periphery or outside the organization who can convert the technical act to profit.
- The differential association syndrome refers to the criminal's use of small deviations from the accepted practices of his associates. Groups of people working together may engage in unauthorized acts that escalate to serious crimes. The competitive nature of computer specialists and their often elitist attitudes can result in one-upmanship competition performing pranks.
- The Robin Hood Syndrome is exhibited by most of the criminals interviewed. They differentiate strongly between harming people, which is highly immoral within their standards, and harming organizations.

Beware Logic Bombs—instructions maliciously added to a program, set to go off when specific data conditions are satisfied.

• Some computer specialists believe that using an idle computer does no harm, and that they have a right to use it for challenging intellectual exercises. All but one of the criminals interviewed indicated that thinking of their computer-related crimes as games played a significant part in motivating them to continue their fraudulent activities.

The summary profile of the potential criminal, based on those caught, is: young, intelligent, with varying degrees of computer expertise. But there are always exceptions. One computer operator had access to a repeat button on the printer that was meant to allow repeat printing if a payroll check was unusable. When his check came through, he kept pressing the repeat button to print multiple checks for himself. He then took the batch of checks with identical information on them—name, number, data, amount, etc.—at the same time to one bank teller who understandably became suspicious. The technology involved was pushing a button.

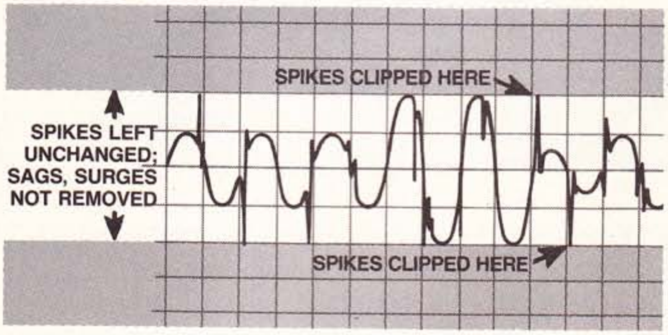
Dr. Harold Joseph Highland is distinguished professor emeritus of the State University of New York and is editor in chief of Computers & Security. *Esther H. Highland is professor emerita of the City University of New York and is managing editor of* Computers & Security. *This article is adapted from* Protecting Your Microcomputer System *by Harold Joseph Highland, 244 pages, John Wiley & Sons, Inc.*



YOUR FIRST-CLASS COMPUTER DESERVES A FIRST-CLASS LINE VOLTAGE CONDITIONER

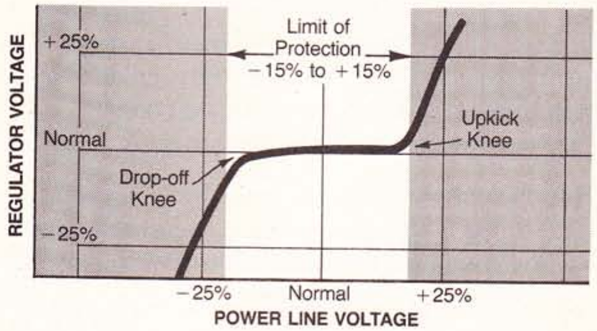
It Doesn't Pay To Go Cheap When It Comes To Power Protection

Your computer functions properly only when the electric power is clean and stable — free of spikes and glitches, of sags and surges, and brownout level voltages. Experienced computer users know this. But many are misled into buying voltage protection equipment that soon proves inadequate and not worth the alluring price. Before you decide to protect your computer from unstable, noisy power ask yourself:



What Do "Spike-Clippers" Really Clip?

Spike clippers or surge suppressors only suppress spikes exceeding "clip voltage levels" which already are much in excess of normal voltages. Spike clippers and surge suppressors do not eliminate electrical noise and surges below the "clip level" and do nothing whatever to get rid of sags, glitches and brownouts. Just think about that!

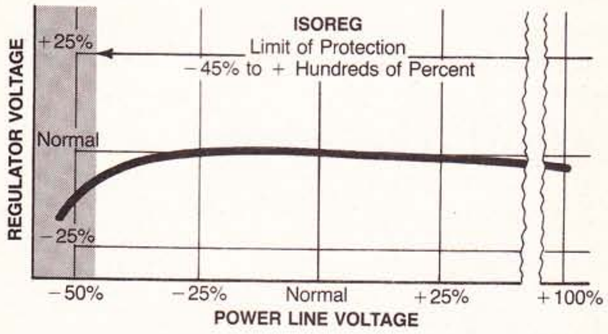


What Do Regulators Really Regulate?

±15% voltage regulation means that the regulator's output is stable, more or less, when the power line voltage varies by up to ±15% from normal. What if the voltage momentarily drops by 20% or rises by 25%?

Here is what your computer gets from many voltage regulators: A good kick of an over-voltage if the power line surges by more than 15% above normal!

Or a steep drop-off in voltage as soon as the power line voltage sags below 85% of normal!



Do The Job Right — With ISOREG

When an ISOREG module protects your computer the voltage does not kick up even when the power line voltage surges 100% above normal. And when the line voltage momentarily drops 30% to 40% below normal, your computer still gets sufficient voltage for trouble-free operation! Think about that!

Why Expose Your Computer to Brownout Voltages and Spikes and Surges?

It makes no sense when you can have full protection. ISOREG offers line voltage conditioners from 125VA to 50kVA, single phase, and from 7½kVA to 150kVA, 3-phase.

GET COMPLETE INFORMATION by calling toll-free **1-800-225-5078.** In Massachusetts call 617/486-9483. Or fill in the Reader Service Card.

ISOREG
CORPORATION
410 Great Rd., P.O. Box 486, Littleton, MA 01460 USA
TWX 710-347-6974 ISOREG LTTN.

ISOREG is a Registered Trademark of ISOREG CORPORATION

Introducing THE TOUCHSCREEN PERSONAL COMPUTER.

The Hewlett-Packard 150.

Touch the screen and learn. It's the easiest way ever to get comfortable with a personal computer. Whether you're finding an address with Personal Card File or making a phone call,* our new Touchscreen Personal Computer responds to your touch.

Touch the screen and edit. To delete a line, edit a sentence or move a paragraph, touch the words you want changed. Then execute your commands by simply touching one of the touch-activated labels on the screen. WordStar® word processing has never been easier to use.

Touch the screen and explore. To change a VisiCalc® worksheet, touch the number or one of the labels appearing on the screen. Then use the keyboard for keying-in numbers. Financial "what-if" problems change into answers right before your eyes.

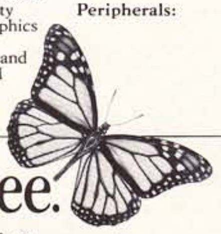
Touch the screen and see. With HP Graphics and a touch, you'll convert all your numbers to graphs and charts. And with the optional internal printer, you can print copies of all your work. Which, by now, will seem more like play.

Get in touch with your Hewlett-Packard dealer. Call (800) FOR-HPPC to find out where to see the Touchscreen Personal Computer. Who knows? You might get in touch with a whole new you.

Hewlett-Packard is pleased to support U.S. athletic programs by providing the computers and terminals used to compute the scores and statistics in the 1984 YMCA Swimming and Diving Championships.

HP 150 at Glance.

User Memory:	256K-640K bytes	**Keyboard:**	107 keys, 8-ft. cord attaches to system unit, 10-key numeric pad, 12 function keys (8 screen labeled)
Operating System:	MS-DOS 2.0		
Microprocessor:	16-bit, 8088, 8Mhz		
Permanent Memory:	(ROM) 160K bytes		
Diagnostics:	Power-on self testing	**Compact Size:**	2.1 sq. ft. desk space
Display Screen:	Touch-activated, green phosphor 80 characters X 27 lines 9 x 14 character matrix Upper and lower case Simultaneous text and graphics capability 390v x 512h graphics resolution 1024 characters and symbols in ROM	**Communications:**	2 RS-232 ports (Built-in) HP-IB (IEEE-488) (Built-in) IBM 3278 (SDLC, BSC), Up to 19,200 bits per second
		Peripherals:	Choice of printers (including optional internal printer), plotters, 3.5" and 5¼" floppy drives (264KB formatted), Winchester hard discs (5 and 15 MB)



Setting you free.

Hewlett-Packard Personal Computers

HEWLETT PACKARD

*With modem at extra cost.
WordStar is a registered trademark of MicroPro.
VisiCalc is a registered trademark of VisiCorp.

Hard-disk enhancement for file-sharing

Bering Industries, a manufacturer specializing in HP-compatible mass-storage products, announced a firmware enhancement called Option 660 for its Series 3000 Winchester disk subsystems to support file-sharing among two or three HP computers.

Without the high cost and complexity of a full-scale local network, Option 660 transfers files automatically among computers in a mailbox arrangement. Connection to the hard-disk subsystem is by standard HP-IB cables. No additional hardware is needed to amplify the signal, as long as the distance from the computer to its disk port is about 20 meters or less. A short software utility is needed at each sharing computer. Not limited to Bering-made utilities, users can customize the arbitration algorithm to their specialized applications.

Option 660 offers three sizes of shared information space (SIS): 1.2M bytes, 4.9M bytes, 9.8M bytes. Most importantly, it allows each computer to access SIS via software control. Once access is granted to a computer, SIS is locked out until it is released. Users can add a time-out arrangement and other customization by using source documents provided by Bering.

The Series 3000 is hardware-, software- and media-compatible with all HP technical and personal computers, including HP 1000, 9000, Series 200, 500, 100 and 80, 98XX desktops, 250 and 64000 development systems. Each such subsystem includes an integral power supply and controller. Transfer rate is 174K bytes/s, about three times that of similar HP 913X products, according to Bering.

A single Option 660 costs $480; multi-port options are prerequisites. A two-port Option 660 costs $700, and a three-port Option 660 costs $850.

Bering Industries, Inc., 1400 Fulton Pl., Fremont, CA 94539.

Quiet ink-jet printer from HP

HP has introduced its model 2225 ink-jet printer for personal computers that operates at less than 50dB and costs less than $600.

The portable model, marketed as the Think-Jet Printer, can be used with HP portable and desktop computers, including the 150 as well as with PCs from IBM, Compaq and Texas Instruments.

By definition, ink-jet printers paint characters on paper by spraying ink through tiny holes in a printhead. Since the printhead never touches paper, as it would on other types of printers, there is less noise than with other types of printer.

The 2225 also features a combined printhead/ink reservoir in one disposable unit. When a cartridge runs out of ink, it can be replaced with one containing ink and a new printhead for less than $10.

Key 2225 specifications are:

- 150 CPS;
- 11 by 12 dot-matrix characters;
- multiple print sizes;
- bold and underline that do not slow printing;
- 11 languages supported;
- dimensions of 11.5 inches wide, 8.1 inches deep and 3.5 inches high;
- less than six pounds;
- 500-page average ink-cartridge life;
- 200-page average battery life;
- several battery interfaces;
- tractor and friction paper feed;
- full graphics capability (192 by 96 or 96 by 96 dots per inch).

Any paper can be used with the printer, although the best print quality is on ink-jet paper, which costs and weighs the same as bond.

HP, 1000 N.E. Circle Blvd., Corvallis, OR 97330.

RELIABILITY TESTING LAB
ENVIRONMENTAL TESTING AREA

HP plotter combines features

HP's 7090A combines the benefits of digital plotters, waveform and X-Y recorders and data acquisition systems into a single laboratory-graphics device and merges recording, plotting and computing.

As a low-frequency waveform recorder, the $4,400 7090A provides 1K word by 12 bits of buffer and a 30K samples/sec analog-to-digital converter on each channel. Sine response is 3 kHz, and multiple triggering modes with pre- and post-trig-

continued

HEWLETT PACKARD

- Personal Computers
- Plotters & Printers
- SOFTWARE
- Supplies
- Calculators
- Accessories

ALL IN STOCK!
NOW

ACE COMPUTER CENTER

3349 Piedmont Rd.
Atlanta, Ga. 30305
CALL
404-262-1022

*Specify Shipping Method

The Executive
3.5″ Micro Floppy File

- Sturdily crafted of the finest quality oak.
- Beautiful hardwood finish complements office decor.
- Index tabs provided for organizing and categorizing diskettes.

Executive I — $24.95
(Holds 25 Diskettes)

Executive II — $34.95
(Holds 50 Diskettes)

Designate choice of light or dark finish.

Include $2.50 extra for handling and shipping.

Executive Micro Accessories
5800 "R" Street • P.O. Box 56142
Little Rock, Arkansas 72207
(501) 663-5210

Dealer Inquiries Invited

continued

ger viewing are provided to examine transient phenomena. Buffers allow recorded data to be previewed with an oscilloscope or plotted. The 7090A also prints the time and date when the trigger occurred.

As an analog X-Y recorder, the 7090A offers three high-sensitivity, high common-mode rejection rate (CMRR) inputs for X-Y or Y-T recording, 41,000 calibrated sensitivity ranges and zero offsets, 2 g. constant acceleration and 127 cm/s (50 inches/s) slewing speed. The instrument also has BNC (bayonet-type) connectors for remote control, an on-board time-of-day clock and nonvolatile memory for storage and retrieval of measurement setups.

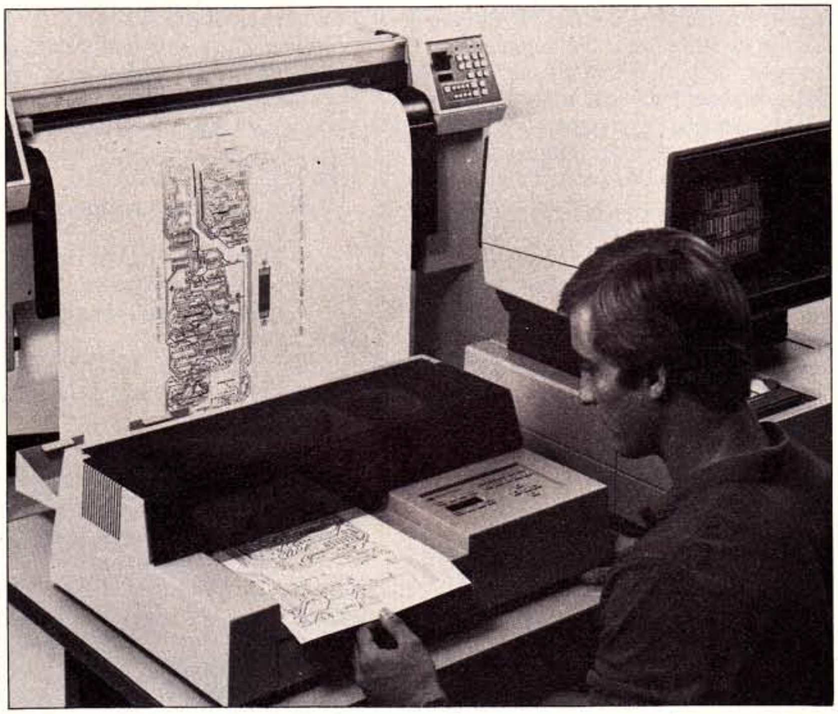
The 7090A performs as a plotter when connected to a controller or as a smart instrument. It includes 42 HP Graphics Language (HP-GL) instructions and draws at 75 cm/sec (29.5 ips) in plotter mode.

Six pens in up to 10 different colors and two line widths are available to plot data, make grids, annnotate setup conditions and print other information. Output can be plotted on B/A3-size (11 by 17 inch) paper, A/A4-size (8.5 by 11 inch) paper and transparency film.

The 7090A can acquire and send data to a controller via the HP-IB at a streaming rate of up to 250 samples/s. It can also receive data from the controller to compare with a current measurement, and with its programmable triggering, allows iteration of measurements or checking for go/no-go conditions.

The 7090A is menu-driven, written in BASIC and designed for use with HP Series 200 computers. Its control program includes the following capabilities: measurement setup, measurement, annotation, data manipulation (including storage and retrieval), softscreen display and hardcopy plotting.

HP, 1820 Embarcadero Rd., Palo Alto, CA 94303.



Fastest-ever HP graphics plotter

The HP 7550A is HP's fast 11 by 17-inch plotter featuring 31.5 inches/sec plot speed and 6 g. acceleration. The $3,900 7550A is believed by HP to be the fastest B-size pen plotter on the market and makes letters at eight to 10 characters per second.

The 7550A's other features include an LCD display with function keys for reporting plotter status and program messages, and replot, a feature that draws up to 99 copies of an original graph without rerunning the program. The plotter automatically loads sheets of paper in response to either front-panel or program commands and will feed up to 150 sheets without reloading.

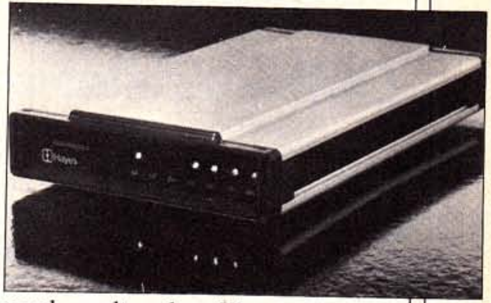
The front-panel function keys replace the hard-switch settings used on older plotters. Combining the display with the function keys enables the user to choose functions such as plot rotation, replotting and alignment to preprinted or pregridded paper.

Additional features include 20 international-character sets in two fonts, including Japanese Katakana and most European languages, user-definable character-set capability, an arc and circle generator, a line-pattern generator, polygon definition and area-fill commands, point digitizing, a built-in self-test and block-mode I/O error checking and recovery for RS-232-C. A 12-kilobyte I/O buffer speeds system communication.

The 7550A features both the HP-IB (IEEE-488) and RS-232-C/CCITT V.24 interfaces. Using only one serial port, the plotter can be connected either directly to the computer or in series between a terminal and the computer.

HP, 1820 Embarcadero Rd., Palo Alto, CA 94303.

Inter-terminal communications via telephone



The Smartmodem 1200 lets RS-232C-compatible computers or terminals communicate over telephone lines at 1.2 kbit/s.

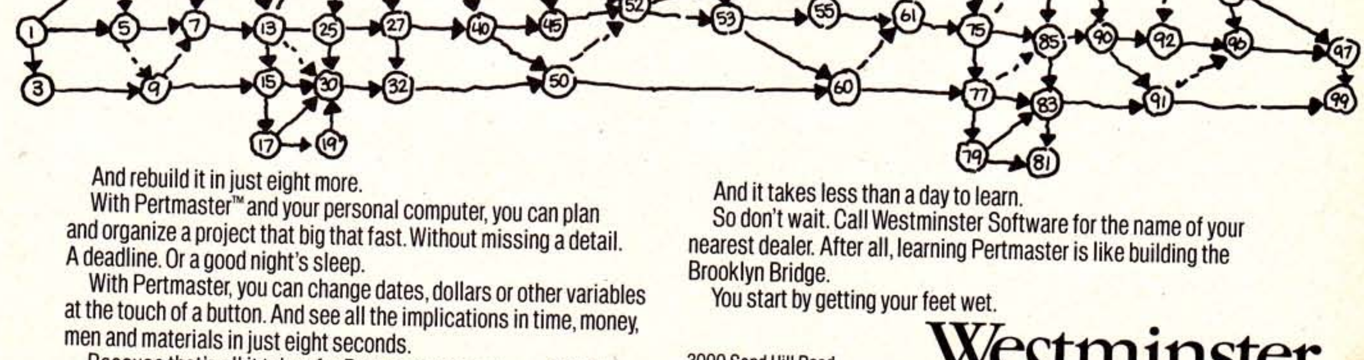
Like the original Smartmodem 300 for communicating up to 300 bit/s, the Bell 212A-compatible Smartmodem 1200 also connects directly to the telephone line and an RS-232C port. The Smartmodem 1200 is approved by the FCC for direct connection to any domestic telephone setup for both pulse and tone dialing. Both types of dialing can be combined in a single command with pulse used, for example, to access a PBX board and tone used to dial an outside number.

At $699, the Smartmodem 1200 is described by its manufacturer as being two modems in one, operating at either 0-300 bit/s or 1.2 kbit/s. It is also an intelligent system that executes user commands and responds with either decimal digit or English word result codes. The modem can be controlled by any programing language and includes all circuitry for auto-dial and auto-answer, thereby eliminating the need for auxiliary equipment and making the Smartmodem 100 a standalone system.

Power-on default options are controlled by eight switches, four of which can be overridden by software commands. Options include full or half duplex, autoanswer and result-code type. Unique "set" commands can select and change parameters, such as dialing speed, escape code character and number of rings before the modem answers a call.

Hayes Microcomputer Products, Inc., 5923 Peachtree Industrial Blvd., Norcross, GA 30092.

BUILD THE BROOKLYN BRIDGE IN 8 SECONDS.



And rebuild it in just eight more.

With Pertmaster™ and your personal computer, you can plan and organize a project that big that fast. Without missing a detail. A deadline. Or a good night's sleep.

With Pertmaster, you can change dates, dollars or other variables at the touch of a button. And see all the implications in time, money, men and materials in just eight seconds.

Because that's all it takes for Pertmaster to analyze a PERT network of up to 1500 events.

©1983 Westminster Software, Inc. Pertmaster is a trademark of Westminster Software.

And it takes less than a day to learn.

So don't wait. Call Westminster Software for the name of your nearest dealer. After all, learning Pertmaster is like building the Brooklyn Bridge.

You start by getting your feet wet.

3000 Sand Hill Road
Building 4, Suite 245
Menlo Park, California 94025
(800) 321-7300
(800) 321-7298 (California)

Westminster Software

NEW

OMNI-BUSINESS ACCOUNTING
FOR
HP-150

- General Ledger
- Accounts Receivable
- Accounts Payable
- Payroll
- Inventory
- Point of Sale
- Other Vertical Mkt. Applications

OMNI
SOFTWARE
ATLANTA, GA
404-262-2152

COMPUTER PROGRAMS FOR INDUSTRIAL USERS
SELECTRA ($295.00)

For the selection of mechanical power transmission components.
SHAFTS–Different load conditions, standard or special alloy.
CHAIN DRIVES–Standard ANSI roller chain and sprockets. Single and multiple strand components. 4 sets of options to choose from.
V-BELT DRIVES–Single and multiple heavy duty ANSI/RMA-IP-20-1977 and narrow RMA-IP-22 belts and sheaves. 4 sets of options to choose from.

HYDRASEL ($295.00)

CENTRIFUGAL AND ROTARY PUMP AND PIPING HYDRAULICS–Determines system SH, NPSH, TDH, TH and BHP for all pipe diameters and viscosities. Optimizes pump selection.
CONTROL VALVES–Sizing coefficient for liquid, gas and vapor services involving choked flow, and laminar or transitional flow.
COMPLEX VESSELS–Volume calculations as a function of liquid level.

THE COMPLETE PACKAGE ($395.00)

- FAST, ACCURATE, EXTREMELY EASY TO USE
- AVAILABLE FOR MOST POPULAR PERSONAL COMPUTERS: HP-86/87, IBM-PC, APPLE II/II+/IIe, TRS-80 I/III/IV
- 100% REFUND GUARANTEE IF NOT FULLY SATISFIED
- DESCRIPTIVE LITERATURE & USER'S MANUAL AVAILABLE

FOR DETAILED INFORMATION CALL OR WRITE:

IN FLORIDA: (305) 442-1133 (9:00 AM TO 5:00 PM EST)
TOLL FREE: (800) 222-1377 (10:00 AM TO 7:00 PM EST)

NATIONAL PLANNING and Consulting Corporation NPCC 55 ALMERIA AVE. P.O. BOX 140489
CORAL GABLES, FL 33114-0489
CONSULTING ENGINEERING SINCE 1962

Extending 150 memory

The Performance Accelerator from the Kelly Company facilitates large memory applications such as Lotus 1-2-3 models, large in-memory data bases, large software compilers and memory-intensive windowing and multitasking applications. At prices ranging from $610 to $1,120, the program comes in three sizes: 128K bytes (about 60 typewritten pages), 256K bytes and 384K bytes, and is upgradable to the Performance Accelerator II.

Besides being able to run the same applications as the Performance Accelerator, PA-II, says the company, yields increased performance, greater memory capacity and better overall reliability by allowing applications software to reside in permanent memory (PROM or ROM). PA-II provides up to 128K bytes of programmable permanent memory or 256K bytes of non-programmable permanent memory, in addition to options available on the standard model.

Prices range from $1,495 to $1,995 for the PROM version, which is initially aimed at software developers.

The Extender Board, at $495, allows for hardware and software development by extending the system backplane out of the CPU. Test points are provided for 20 address lines, eight data lines, 17 control lines and dual test points for each power source.

The Kelly Company, 1544 Redwood Dr., Los Altos, CA 94022.

Bridging the micro-mini gap

The Bridge, according to its manufacturer, Applied Research, is a software/hardware combination that enables microcomputer software to be run from any terminal on an HP 3000. The 3000 will then provide access to a huge library of microcomputer software, avoid duplication of hardware and enhance system integration.

A complete Bridge System consists of a software package and a z-Board co-processor. Together, they execute CP/M programs on a 3000 faster than on standalone micros.

The Bridge can be installed on the HP 3000 Series III using a Starfish adapter, and on HP 3000 Models 30, 33, 39, 40, 44 and 64. The Bridge Device and the Bridge Software each cost $5,000.

Via the Bridge, any terminal connected to a 3000 can act as a microcomputer. The Bridge downloads CP/M into one of the cells on the z-Board, allowing users to execute CP/M programs without wasting 3000 CPU time. The z-Board features four Z80 microprocessors, 256K bytes of RAM and a bit-slice state machine. The Bridge software, together with one or more z-Boards, yields a complete microcomputer environment—without problems associated with floppy disks.

Files created by the Bridge are in CP/M format. They are stored as "virtual floppies" on the 3000's hard disk. This provides faster access time and greater storage capacity. Files can grow dynamically, up to a pre-set limit.

Applied Research Inc., 3930 Freedom Circle, Santa Clara, CA 95054.

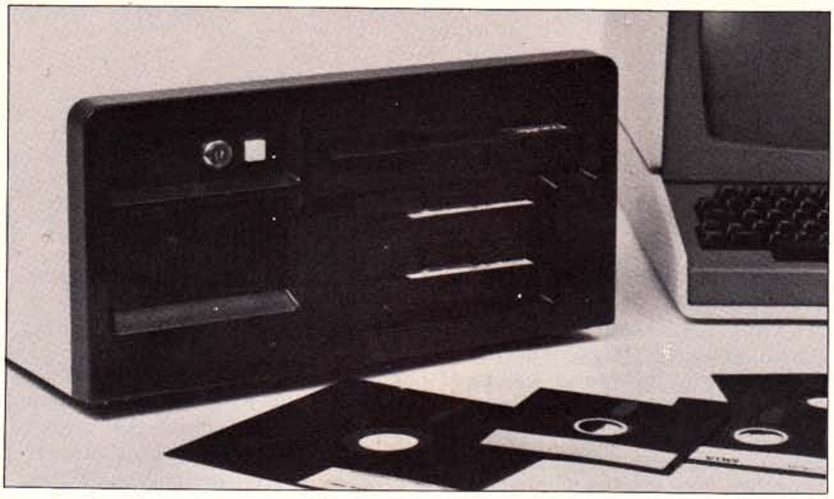
Disk duplicator

The Series One Diskette Duplicator formats blank floppy disks, reproduces information from an original disk onto the formatted disk and verifies correct reproduction. The Series One features high-speed duplication, format versatility, software piracy protection, modular design and ease of operation.

The Series One, manufactured by Formaster, consists of a controller unit with 16-bit microprocessor, a control memory, an optional large data storage memory, one or two proprietary floppy disk controllers and drive units containing one to four disk drives for each floppy disk controller. The system is regulated by several levels of proprietary software.

The new Series Two Diskette Duplicator is a microcomputer-based system specifically designed for office use. This standalone system formats, copies and verifies floppy disks without control of a host computer, making it, according to Formaster, the computer-age equivalent of a plain paper copier.

The Series Two accommodates 5.25-inch 48 and 96 tracks/inch or 3.5-inch 135 TPI drives. It will dupli-



cate single and double-sided single and double density diskettes. The unit includes three disk drives, one for the source and two for duplicating. The press of a button starts the duplication process, and signal lights chart the process from source to completed copies.

CopyLock is Formaster's proprietary piracy protection technology and comes in two forms: CopyLock Standard Protection and CopyLock Custom or Developmental Protection.

Via Series One or Series Two Diskette Duplicator, CopyLock places a magnetic signature on a diskette. The signature can be written only by one of these duplicators. The target computer reads the signature with the help of a special code, but the computer is incapable of writing the CopyLock signature.

Formaster Corp., 1983 Concourse Dr., San Jose, CA 95131.

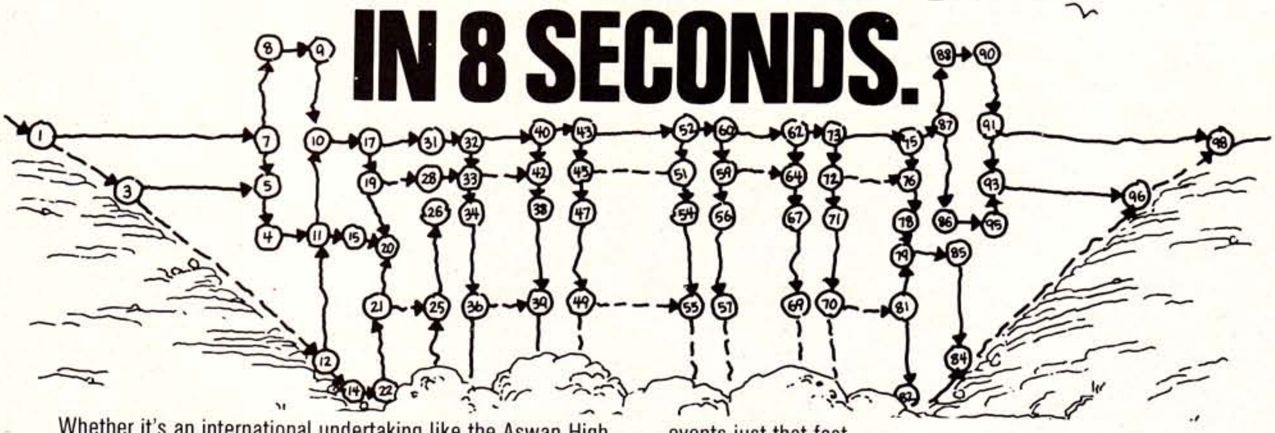
Megabyte memory board for Series 200

Employing 256K RAM chips to quadruple memory density, the new WKBP-16 memory board is the first megabyte memory board for HP series 200 desktop computers.

The board fits HP's models 9816, 9826 and 9836. It can be particularly helpful on the 9816, according to its manufacturer, Eventide, because the 9816 normally cannot accommodate a megabyte of memory without adding an expensive expansion interface, which also slows down the computer and requires additional processor cycles for memory access.

The new memory board provides its megabyte of memory to the 9816 with no expansion interface, eliminating cost and performance penalties associated with expansion interfaces. Also, use of the memory board does not require any appreciable increase in power consumption.

Eventide Inc., One Alsan Way,
Little Ferry, NJ 07643.



HOW TO FINISH ANY DAM PROJECT IN 8 SECONDS.

Whether it's an international undertaking like the Aswan High Dam. A local dock and hatchery. Or a pool in your backyard.

With Pertmaster™ and your personal computer, you can plan and organize it all in just eight seconds.

Then reorganize it in just eight more.

Because with Pertmaster, you can easily optimize any detailed project schedule. Experiment with dates, dollars or other variables at the touch of a button. And see all the implications in time, money, men and materials in just eight seconds.

Because Pertmaster analyzes PERT networks of up to 1500 events just that fast.

And that means you can have lumber, landfill and cement when and where you need them. Without missing a detail. A deadline. Or a good night's sleep.

So call Westminster Software and ask for a dealer near you. Because we make planning a dam site easier.

Even if you're not building a dam.

3000 Sand Hill Road
Building 4, Suite 245
Menlo Park, California 94025
(800) 321-7300
(800) 321-7298 (California)

Westminster Software

© 1983 Westminster Software, Inc. Pertmaster is a trademark of Westminster Software.

High-speed asynchronous communications

A new generation of asynchronous communications software called BLAST (BLocked ASynchronous Transmission) offers speed, efficiency and error immunity on a par with synchronous communications—without the per-station hardware requirements of synchronous, says Communications Research Group. Any computer using BLAST can communicate with every other computer using BLAST and can maintain high-speed communications over satellite links, noisy lines and networks plagued by propagation delay.

BLAST for microcomputers is priced at $250. BLAST for minicomputers is $495 to $1,395, depending on CPU size.

Asynchronous protocols (which send large data blocks, stop and wait for an error check, then resend an entire block in case of error) become sluggish in the face of network noise and related communications gremlins. According to its maker, BLAST's protocol, which hardly slows at all, continuously interleaves unit blocks of data with check and acknowledgement blocks, and does so in each direction.

BLAST provides an asynchronous alternative to the sophistication and efficiency previously associated only with synchronous communications. BLAST's asynchronous nature is, according to its manufacturer, Communications Research Group, especially useful in systems that communicate with a large number of microcomputers.

Typically, before synchronous communications can begin, each microcomputer requires an investment in special synchronous communications adapter hardware. BLAST requires no such expenditure. BLAST operates through common RS-232C serial ports and asynchronous modems, over dial-up lines or private networks. BLAST can also work from port to port over a direct connection at speeds up to 19.2 kbit/s.

BLAST software is menu-driven, supports unattended operation, can emulate asynchronous ASCII terminals, provide access to any timesharing network (additional charges may be required), can capture and transmit binary or text files, can invoke user-defined log-on sequences or complex repertoires at a keystroke and permits user-defined function keys.

Communications Research Group Inc., 8939 Jefferson Hwy.,
Baton Rouge, LA 70809.

3000 capability for the 150

SIGSTAT, an updated version of BMD statistical software, is a statistical analysis package that gives to the HP 150 the capabilities of an HP 3000 by providing numerous statistical procedures for data presentation and analysis.

SIGSTAT's 35 programs are priced at $325 complete for eight double-sided (320K) floppy disks with a 130-page operations manual. (An optional 774-page manual is published by the University of California Press.)

SIGSTAT's programs include univariate and multivariate analysis of variance and covariance, general linear models, regression, factor analysis, canonical correlations, descriminant analysis, life table and survivable rate, time series, probit, cross-tabulations, chi-square, log-linear, residuals, histograms, scatter plots and data transformations.

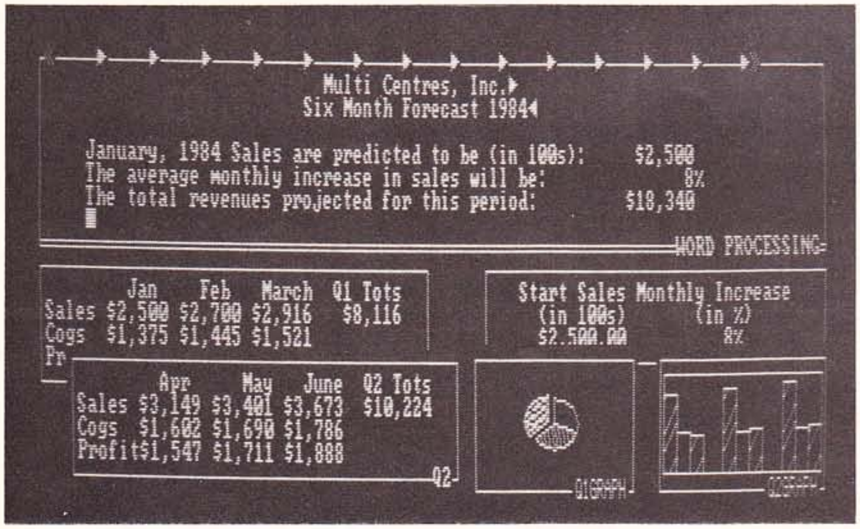
SIGSTAT handles up to 80 variables on 32,767 cases, including pairwise and listwise deletion options for missing variables.

HPTouch support is planned for future releases.

Significant Statistics, 3336 N.
Canyon Rd., Provo, UT 84604.

All-in-one business applications

Symphony, Lotus Development's new all-in-one software system, combines word processing, a data base with forms and mail-merge capabilities, state-of-the-art communications, advanced spreadsheet and business graphics into a single integrated program. A unique window management system works with all Symphony functions, allowing users to display spreadsheets, documents, forms, graphs and terminal sessions in layouts both on screen and on paper.



```
                       Multi Centres, Inc.▸
                     Six Month Forecast 1984◂

   January, 1984 Sales are predicted to be (in 100s):     $2,500
   The average monthly increase in sales will be:             8%
   The total revenues projected for this period:          $18,340
```

```
       Jan    Feb   March  Q1 Tots
Sales $2,500 $2,700 $2,916   $8,116
Cogs  $1,375 $1,445 $1,521
```

```
          Apr    May   June  Q2 Tots
  Sales $3,149 $3,401 $3,673  $10,224
  Cogs  $1,602 $1,690 $1,786
  Profit$1,547 $1,711 $1,888
```

```
Start Sales Monthly Increase
 (in 100s)       (in %)
 $2.500.00         8%
```

Symphony, a 150 version of which is planned, requires a computer with a minimum 320K bytes of random access memory. The $695 program can run on a single disk drive. It is available to owners of the firm's popular 1-2-3 program for $200.

Information can be viewed via Symphony from different perspectives, and unrelated data and information can be displayed at the same time. For example, a spreadsheet and a graph made from the spreadsheet can be displayed on screen by creating two windows with a few keystrokes. More windows can then be added to simultaneously view and process business letters, data base reports, information from another computer and so on. Alternatively, a user can display just one piece of information at a time.

Lotus Development Corp., 161 First St., Cambridge, MA 02142.

Complex Math simplifies BASIC

Structured Software Systems has announced a language enhancement called Complex Math for the BASIC 2.0 operating system on the HP Series 200 desktop computers.

Complex Math adds complex number support to the BASIC language on HP 9816, 9826 and 9836 computers. Complex variables and arithmetic functions are fully supported and integrated into standard HP BASIC language. Features include all complex math capabilities of ANSI Standard FORTRAN, and complex operations can be performed on entire arrays.

Uses of complex numbers in scientific and engineering applications are nearly infinite. According to its manufacturer, Complex Math, at $975, makes HP BASIC and the 98X6 series machines the tools of choice in many applications where they were previously not a convenient alternative. The firm contends that HPExtended BASIC combined with Complex Math is equal or superior to ANSI Standard FORTRAN in nearly every respect. In terms of programmer productivity and ease of use, it is considered superior to most FORTRAN implementations.

Complex Math comes with an operating instruction manual and is shipped on a 5-inch disk if ordered for the 9826/36, or on a 3.5-inch if ordered for the 9816.

Structured Software Systems Inc.,
Box 1072, Irick Rd,
Mount Holly, NJ 08060.

Three for CAD

Three software packages from Land Innovation include most common routines used by surveyors and civil engineers to coordinate geometry calculations, as well as full plotting, vertical design, profile plotting and a complete legal writing section, which uses computed points to write legal descriptions.

The HP86/87 version includes a complete software section for the HP 41CV(x) on bar code and a data transfer program for communications between the HP 41 and the HP 80 series. The HP9816/36 version includes use of a rotary knob and graphic error messages. These packages will plot any size and any scale using the CRT or an external HP plotter.

- Planning Supplement: HP 86/87 will automatically compute, print out and compile drawing instructions on lot and street configurations given only a few reference points.
- Planning Supplement: HP 9816/36 adds to these features with Graphic Prompting, a complete landscape architecture section, a modeling section and an HP41CV section, which includes software on bar code and data transfer through an

How To

touch

Up Your Books

Staying in touch with your books helps you keep your business profitable. The Boss Financial Accounting System keeps you in better touch than modular accounting programs. And it's "touch-screen simple" with your HP 150.

The Boss is structured the way you do business. It contains the general ledger, accounts receivable, and accounts payable in one straightforward system. The information you need is always at your fingertips.

With The Boss, you'll never be stuck switching between "modules" every time you want to process a transaction. The Boss is a totally **integrated** system that lets you enter any kind of transaction in any order you choose.

The Boss doesn't make you close your books to get a report. The Boss works in **real time**, so there's no posting, no batch entries, and no waiting for information.

Don't let modular accounting software make a mess of your books. Get in touch with The Boss. **Ask your HP dealer** for a demonstration of The Boss Financial Accounting System or any of The Boss software products. Or call us toll free at **1-800-531-5483** for the name of the dealer nearest you. In Texas, call 1-800-252-8184.)

***The Boss* Business Software Products.**

Balcones

Balcones Computer Corporation

Need Low Cost I/O?

FOR: HP ◦ COMMODORE
SAGE ◦ OSBORNE
IEEE-488
GP-IB

The 6450 General Purpose Parallel Interface will connect to your computer via the IEEE-488 Bus (HP-IB) and give you:

**8 Input Bits, 8 Output Bits,
Clear and Trigger pulses,
a Service Request Interrupt,
and more.**

For applications such as:
- Custom Autotest Equipment
- Computer Controlled Experiments
- Expanding HP-80 Series I/O Capacity
- Process and Machine Control
- Interfacing Printers to HP-IB

All IEEE-488 Talk-Listen Functions are supported. The 6450 is ideal for increasing the I/O capacity of Hewlett-Packard computers. As many as fourteen 6450's, interfacing printers, control systems, and custom logic can be attached to a single HP-IB card, thus freeing valuable I/O slots within the computer for memory expansions and special ROMS. Two versions of the 6450 are available, a PC board for integrating into systems, and a complete unit for benchtop and rack mount applications. Prices start at $249. Application notes describing interfacing A/D convertors, UARTs, and multiple byte data are included.

Call or Write for Details:

SEITZ

Seitz Technical Products, Inc.
PO Box 76, New London, PA 19360
(215) 255-5111

COMPLEX MATH

for HP Series 200
DESKTOP COMPUTERS

Language enhancement adds complete ANSI Standard FORTRAN complex math support to BASIC 2.0.

- Fully integrated into BASIC language
- Provides new math functions including hyperbolic functions
- Performs complex operations on entire numeric arrays

Ideal for electrical design and circuit analysis programs.

Price: $975 (USA Domestic)

For complete information contact:

STRUCTURED SOFTWARE
SYSTEMS, INC.
Box 1072 Irick Road
Mt. Holly, New Jersey 08060
609/267-1616 Telex 299 043

HP82169A interface. At its slowest, processing speed for 100 lots is 2.5 minutes.

- Interior Design: HP 9816/36 is a complete design and drafting software with over 120 built-in common furniture and floor plan items that even a novice user can operate. Floor plans are easily traced into memory, and designs are easily filed, areas merged and new items created. Plotting is done at any size and scale using any HP plotter or computer.

*Land Innovation Inc., 7359
Berkshire Ct., Maple Grove,
MN 55369.*

Series 80 communications interface

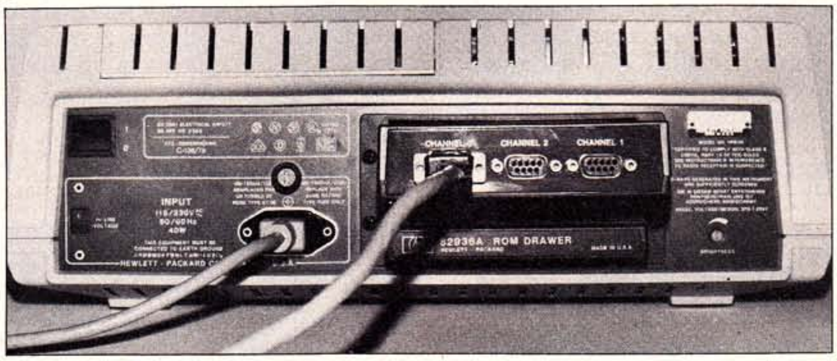
Hewlett-Packard Series 80 computers can be transformed into applications-oriented intelligent terminals via the COM-80 Communications Interface. The card interface allows asynchronous and bisynchronous data communications on multiple ports. The added capability to handle three hardware devices per card is standard. Using the interface with a Series 80 computer yields the added benefit of a Houston Automatic Spooling Program (HASP) workstation, allowing use of major applications software packages. This is available via major timesharing services while retaining local control of data.

Along with the other standard features, the interface can collect, edit, store and forward data from an ASCII device to a host computer without re-cabling using the multiport feature.

CDS
COM-80
CHANNEL 3
CHANNEL 2
CHANNEL 1

Applications include:
- 2780/3780 RJE Terminal Emulator for HP 86 and 87;
- 2780/3780 RJE Terminal Emulator for HP 85;
- Asynchronous Terminal Emulator for HP 85, 86 and 87 with file transfer capabilities;
- All function-key driven applications.

*Corporation for Distributed Systems,
17440 Dallas North Pwy.,
Suite 103, Dallas, TX 75252.*



Touch The Boss

Balcones Computer, producer of The Boss Business Software Products, has released special versions of its software that use the HP 150's touch screen capabilities.

Products in The Boss line available for the 150 include systems for financial accounting, payroll management, time billing and inventory accounting.

The software takes advantage of the 150's touch-sensitive menu selection and on-screen softkeys, as well as function keys on the 150's keyboard.

The Boss products, which range in price from $195 to $1,595, use real-time processing, with automatic updates of all relevant reports and accounts.

*Balcones Computer Corp., 5910
Courtyard, Austin, TX 78731.*

The CAD road mode

Road Design System aids engineers designing roads—from the initial ground survey through contract preparation and final construction. The program, according to its manufacturer, Enarsoft, can quickly and accurately calculate and display alternate designs, and obtain optimum vertical and horizontal alignments. Once a design is finalized, Road Design System provides final design drawings for inclusion in contract documents. The program can also be used to calculate "as-built" quantities for contract review and payment following construction.

Road Design System, at $835, is available for HP models 86 and 87, in both 5.25 and 3.5-inch disks. The program is compatible with all Espon printers and all HP graphic printers. The package includes a user manual and two disks.

The interactive program's features include:

- on-screen menus, from which all commands are selected. The menus control program flow and lead the user to either additional menus or requests for additional data.
- error-checking which gives clearly worded explanations of incorrectly entered data and an opportunity to re-enter the data.
- file handling. Files are related by common project names and embedded file numbers allowing for reduction in frequency of mass storage operations, ease of insertion and deletion, ability to design a road of any length and use of multiple disks.
- graphics, on-screen and generated as printer output. They allow the user to see how the road will look. Graphics can be scaled and inspected by zooming in on specific points.
- audio signaling, which speeds data entry and alerts the user to errors.
- function keys, which are used extensively by the program.
- on-screen help messages to guide the user.

The program follows standardized road design procedures, including the following steps:

- The user enters all topographic notes into special data files. There is no limit to the length of the roadway.
- Following entry and checking of field notes, the engineer enters the design parameters that define the type of roadway. They include template type, horizontal offset, superelevation and widening requirements. Vertical alignment can be controlled by vertical offset, template centerline elevation or ditch bottom elevation (to match existing cross street elevations).
- Data can be reviewed on-screen or routed to a graphic printer.
- In the production mode, the program proceeds from section to section and outputs to the graphic printer the details of the design. No user input is needed.
- If, after construction, it is necessary to calculate the as-built quantities, the program calculates the actual earthwork quantities for contract payment.

Enarsoft, P.O. Drawer 160,
Glenwood Springs, CO 81602.

Graded data base allows improvement

MAG Software's data base management software, which includes MAG/base^1, MAG/base^2 and MAG/base^3, are graded programs providing increasingly sophisticated features that allow users to step from one level to the next as their expertise develops. MAG/base^1 is geared for novices and provides list management and single file report writing. MAG/base^2 adds report writing, drawing data from up to five files to create complex reports and new target files. MAG/base^3 adds advanced program development features. MAG/base^2 and ^{3} have all the respective capabilities of MAG/base ^{1} and ^{2}.

MAG/base^1, ^{2} and ^{3} are now available for the HP 87 and 125. All packages run under PC-DOS, MS-DOS, CP/M-80, and CM/M-86 and MP/M-86. Prices are $295, $495 and $795. Upgrading from MAG/base^1 to MAG/base^2 costs $200 and $300 from MAG/base^2 to MAG/base^3. Upgrades involve no file changes or price penalty.

According to its manufacturer, MAG/base^1 can:

- create electronic files with

continued

How To Get In *touch* **With Your Business Growth**

You need accounting software that lets your business grow without creating havoc with your books. The Boss Financial Accounting System allows for more growth than modular accounting programs. And it's "touch-screen simple" with your HP 150.

With The Boss, you don't re-create your records just because you've added a new account. The Boss works in **real time** so you can add a new account anytime — even in the middle of a transaction.

The Boss handles 900 accounts in the chart of accounts *and* 9,000 customers/vendors in receivables and payables.

The Boss gives you full financial reporting for up to 900 profit centers. With an additional 900 category codes, you can track results by salesperson, product, supplier, client — any breakdown you need.

Your bookkeeper will appreciate **one standard form** on the screen for all types of entries. And accurate audit trials allow you to track every transaction.

Don't let limited-capacity accounting software limit your business growth. **Ask your HP dealer** for a demonstration of The Boss Financial Accounting System or any of The Boss software products. Or call us toll free at **1-800-531-5483** for the name of the dealer nearest you. (In Texas, call 1-800-252-8184.)

***The Boss* Business Software Products.**

Balcones

Balcones Computer Corporation

continued

any information;

- find any information MAG/base^1 has saved;
- cross-index filed information in up to 99 ways.

MAG/base^2 is MAG/base^1 plus a relational report writer. MAG/base^2 can:

- provide a comprehensive business report using information from up to five separate files;
- create a new file or update an existing file combining information from up to five files.

MAG/base^3 is MAG/base^2 plus menu definition, password protection, screen management functions, an advanced data management language and MAG/sam, a multi-keyed file management system. MAG/base^3 can:

- protect sensitive data and critical functions with multi-level password security;
- create custom data input and display screens through user-callable, hardware-independent functions.

MAG Software Inc., 21054 Sherman Way, Suite 305, Canoga Park, CA 91303.

Laboratory testing and analysis

Microbiology Laboratory is a series of 12 programs written for the HP 125 and soon to be converted for the HP 150. The programs, which cost $25,000 together and from $500 to $1,500 individually, use screen-labeled function keys and touch as menu access to program commands. All programs are written to conform with the work flow of a complete microbiology laboratory. And a common statistical program analyzes raw lab data on disks to find the number of tests performed in each category. The totals are multiplied by a factor to arrive at a procedural time value (PTF) for required reporting to the state laboratory in California.

In general, the programs ask for and store: patient name, address, city, age/date of birth, sex, submittor and date received. Samples are assigned a lab number, which is recalled to enter results. A final log is printed when the results are in. Lab slips can be printed on request, and reagent log numbers are stored in memory and printed on the appropriate worksheet when the test is run.

Each program has complete touch-driven search and edit capabilities. All programs can be searched for by: date, submittor, patient name and/or specimen result. Search is controlled by the touch screen, so an unskilled computer user can easily find the information.

The 12 programs are:

- Gonorrhea Screening;
- Mycobacteriology;
- General Bacteriology;
- Rubella;
- Rabies;
- Syphilis Test (Veneral Disease Research Laboratory/Florescent Trebnomea Antibody, known as VDRL/FTA);
- Water Analysis;
- TB-Hematology;
- TB-Chemistry;
- Forensic Alcohol;
- Jail Billing;
- Statistical Program.

BactBob Software, 1229 20th Ave. #1, San Francisco, CA 94122.

Condor™ made Easy! HELP!© Condor™

HELP! Condor was designed with the first time computer user in mind. SoftHelp has enhanced the Condor database to make it more "user friendly."

HELP! Condor is the easy way to **enjoy the power of the Condor relational database without learning commands or syntax.**

HELP! Condor is both a front-end generic MENU, as well as on-line help for every Condor command. The expert Condor user may alter the source code of HELP! Condor saving days of programming.

The manual for HELP! Condor includes:

- Merging Condor files and Word Processors
- Merging Condor and Lotus 123
- BASIC programs
- Command Files Explained

HELP!© Condor™

$149.00

HELP! Condor by SoftHelp, Inc.
3527 Oak Lawn Ave., Suite 179
Dallas, Texas 75219
(214) 559-3095
VISA / MASTERCARD

"It is one of the most useful programs of its type we have ever seen, and believe me, we see a **lot** of software."
Don Kenny
Product Evaluation Manager
Micro D
Fountain Valley, CA

"I think this product can make Condor easier to sell, because it makes the users life easier."
Robert Eigler
President
Micro-Age
Houston, TX

"First time Condor users can now be up and going in minutes instead of hours."
Bob Denton
Vice President, Marketing
Seequa Computers

Network traffic cop

In an office, two or more people can simultaneously attempt to change the same information on their microcomputer network. They can "crash" into each other or freeze the system. And two people can make changes at the same time without either knowing about the other.

Ashton-Tate's new multi-user version of dBase II for the HP 120 and 125 acts as a traffic cop controlling an intersection. While anyone can call up or see information, only one person at a time can change it. After that user is finished, another has a turn in the intersection.

The multi-user version of dBase II, which runs under TurboDos and M/PM 86, features:

- multi-user access to shared files of information;
- record-locking capability;
- index-locking capability;
- file-locking within an application program;
- password security within an application program;
- support of 3Com EtherSeries;
- early support of Corvus Omninet, Novel NetWare, Orchid PCNet;
- a maximum data base size of 65,000 records;
- a maximum field size of 255 characters;
- a maximum record size of 1,000 characters;
- a maximum of 32 fields per record;
- a memory of 128K or more per individual workstation (on 3Com EtherSeries).

Ashton-Tate, 10150 W. Jefferson Blvd., Culver City, CA 90230.

Teaching computer-aided drafting

Graphics Instruction Device (GRID) is a computer-aided drafting program designed for training students. Running on an HP 86B desktop computer, the $495 program can produce, store, retrieve and edit two-dimensional and three-dimensional line drawings. GRID comes with a teaching text, is operated by single key strokes, produces industry-quality drawings and does not require the user to know how to program computers.

GRID also interactively controls an external plotter. A student can watch the plotter pen move after each command. If that is not needed, GRID can be asked to plot the drawing on the video display.

Not all drafting programs available for microcomputers can plot three-dimensional data but GRID can, according to its manufacturer. A student can enter a three-dimensional description of an object and watch the computer plot the object as a wire-form cabinet, as an isometric drawing or as a standard orthographic drawing.

The digitizer module encourages students to create their own menu symbols instead of relying on ready-made symbols. The purpose is to remove the mystery from computer-aided drafting.

The instruction manual contains examples and drawings actually produced by the program. It introduces commands in a controlled manner so students can make simple drawings at their first session.

GRID's instructions are in English, not abbreviations or control characters. And a readable audit trail of instructions issued at each session is available on request if backtracking is required to find an error. If a student forgets to set the drawing scale or size of text characters, GRID will fill in these values so that a novice has an increased chance of a success.

GRID comes with the digitizer module. An 86B configured to run GRID plus a two-pen plotter, a single 3.5-inch disk drive and a 12-inch monitor retails for $4,537. The Graphics tablet, which is not essential, retails for $2,275. A single copy of the GRID manual is available for $9.15.

Responsive Logic, 156 Donald St., Oregon City, OR 97045.

How To Do Financial Reports With A Professional touch

One of the most important parts of any accounting system is the reporting power it provides. The Boss Financial Accounting System gives you more professional reports than simple modular accounting programs. And it's "touch-screen simple" with your HP 150.

The Boss gives you sophisticated financial reports and analyses to monitor your small business's health the same way big businesses monitor theirs.

A Statement of Changes in Financial Position helps you manage your cash flow. Tests of liquidity and profitability measure your financial standing. A comparative income statement, for a department or for the entire company, reflects sales growth over any span of months you choose.

Get financial reports with a professional touch. **Ask your HP dealer** for a demonstration of The Boss Financial Accounting System, or any of The Boss software products. Or call us toll free at **1-800-531-5483** for the name of the dealer nearest you. (In Texas, call 1-800-252-8184.)

***The Boss* Business Software Products.**

Balcones

Balcones Computer Corporation

Excellence
in Hardware
Deserves
Excellence
in Software

PROTRACOA
software
for HP 200,
9000,
9845

AND NOW
★150
★UNIX

p r o t r a c o a

★ **Word Processing**
The Best: PROTRASTAR
Lowest Cost: MINIPRO

★ **Spreadsheet, Data Manager**
The Winner: PROTRATABLES
(Tops in Functionality)

★ **Database Management**
Winner: PROTRA-FORMDATA
Relational: For very large or small systems

HP+ HP+ HP+ HP+ HP+

- **Powerful independent programs forming one coordinated system.**
- **Custom and standard software.**

Call about Inventory & Investment Software

HP+ HP+ HP+ HP+ HP+

p r o t r a c o a
P.O. Box 609
Los Altos, CA 94022
(415) 948-6611
Standard and Custom Software

NEW LITERATURE

HP 41 PROGRAMMING GUIDE

An Easy Course in Programming the HP 41, written by Ted Wadman and Chris Coffin, formerly of Hewlett-Packard, this 256-page hand-lettered text offers an instructional format for understanding and operating the HP 41. Published by Grapevine Publications, P.O. Box 25724, Portland, OR 97225. The book is available in the U.S. for $15 plus $2 shipping and handling.

COMPUTER SATIRE

The Unofficial I Hate Computers Book, illustrated by Rich Tenant and written by John Barry, takes a satirical look at computing and will amuse all those who have ever experienced less than benevolent feelings toward their computers. Published by Hayden Books, 10 Mulholland Dr., Hasbrouck Heights, NJ 07604. The book sells for $4.95.

BUYING SOFTWARE

How to Buy Software: The Master Guide to Picking the Right Program is a comprehensive guide to selecting software. The book provides extensive guidance in the areas of pricing, product quality, compatability, and performance. Published by St. Martin's Press, 175 Fifth Ave., New York, NY 10010. The book sells for $14.95.

SIMPLIFYING DIGITAL ELECTRONICS

Digital Electronics, co-authored by Harry Kybett and Vaughn D. Martin, uses a learn-by-doing format to explain digital electronics to the inexperienced computer user. The guide incorporates experiments that progress in difficulty as the reader becomes more experienced. Published by John Wiley & Sons, 605 Third Ave., New York, NY 10158. The book sells for $10.95.

PORTABLE POWER

Take it With You: The Guide to Portable Business Computing by Richard M. Grelewicz offers a comprehensive overview necessary for the selection of a portable business computer as well as its most compatible and efficient software. Published by John Wiley & Sons, 605 Third Ave., New York, NY 10158. The guide is available for $14.95.

LAW AND COMPUTING

Data Processing Contracts: Structure, Contents and Negotiations, second edition, renders detailed legal advice that makes buying or renting computer products virtually risk free. Topics discussed include effective negotiation strategies and the role of legal counsel in negotiations. Written by Dick H. Brandon and Sidney Segelstein, Esq. Published by Van Nostrand Reinhold Publications, 135 W. 50th St., New York, NY 10020. The 544-page book sells for $44.50.

COMPUTER TALK

The Fundamentals of Programming Languages, written by Ellis Horowitz, provides explanations of Pascal, Ada, Lisp, etc., as well as a chapter on object-oriented programming languages. Published by The Computer Science Press, 11 Taft Ct., Dept. C284, Rockville, MD 20850. This 446-page book is available for $26.95.

MORE COMPUTER TALK

Paradigms and Programming with Pascal by Derick Wook provides numerous paradigms, each illustrated with two problems along with references for further reading and research. Published by Computer Science Press, 11 Taft Ct., Dept. C284, Rockville, MD 20850. The book is available for $25.95.

ELECTRONICS CATALOG

The Catalog of Electronic Instruments features 9,000 electronic instruments for sale including a description of each individual product as well as terms and conditions of sale. Instruments from manufacturers such as Honeywell and Hewlett-Packard are featured. The Genstar REI Sales Company, 17 Wheeling Ave., Woburn, MA 01801.

COMMUNICATION SATELLITES

The Birds of Babel: Satellites for a Human World by Hal Glatzer is look at the history of satellite communication chronicalling its development from Sputnik to the present day. Published by H. Sams & Co., 4300 W. 62nd St., Indianapolis, IN 46268. The book is available for $12.95.

CALENDAR

WINTER COMDEX '84

April 5-7. Los Angeles Convention Center. Sponsor: The Interface Group. Exhibits include the most recent developments in hardware and software as well as other computer related products. Fee: $125. Contact: The Interface Group, 300 First Ave., Needham, MA 02194.

PRODUCTIVITY '84

Philadelphia April 3-4, Boston April 8-9, Teaneck, NJ April 26-27, Minneapolis May 15-16, Chicago May 30-31 and Denver June 12-13. Sponsor: Hewlett-Packard. Seminars offered for personal computer users in such areas as office automation, data base management, networking and various other software applications. Contact: Hewlett-Packard, 19055 Pruneridge Avenue, Cupertino, CA 95014.

VIDEOTEX '84

April 16-18. Chicago Hyatt Recency. Sponsor: London Online. A large exhibition of videotex and teletext systems, the conference will allow attendees to view various systems operations. Fee: $795. Contact: London Online, Suite 1190, 2 Penn Plaza, New York, NY 10121.

FEDERAL DP EXPO AND CONFERENCE

April 17-19. Washington D.C. Convention Center. Sponsor: Interface Group. The main focus of the expo will be the integration of mainframes with microcomputers to increase productivity. Fee: $95 for government employees, non-governmental employee fees vary. Contact: The Interface Group, 300 First Ave., Needham, MA 02194.

THE PERSONAL COMPUTING AND NETWORKING SEMINAR

Pittsburgh April 4-6, San Juan April 4-6, Greenwich, CT April 11-13, Austin, TX April 11-13, Salt Lake City, UT April 16-18, San Francisco April 25-27, Honolulu April 30-May 2, Los Angeles May 9-11. Sponsor: The Center for Advanced Professional Education. This seminar offers a wide range of information on the PC industry and its effects on small business and large corporations. Contact: The Center for Advanced Professional Education, 1820 E. Garry St., Suite 110, Santa Ana, CA 92705.

INFOCOM '84

April 9-12. Hotel Meridien, San Francisco. Sponsor: IEEE Computer Society. The three-day seminar on computer technologies will be preceded by a choice of four pre-conference tutorials outlining new technologies in the computer field. Fee: tutorials plus conference $270. Fees vary for nonmembers. Contact: IEEE Computer Society, P.O. Box 639, Silver Springs, MD 20901.

COMPUTER EXPO SHOWCASE

Miami Beach April 5-8, St. Louis April 12-15, San Diego April 26-29, New York April 26-29, Washington D.C. May 3-6, Houston May 10-13, Anaheim May 24-27, Dallas June 7-10, Seattle June 7-10, Boston June 21-24, Minneapolis June 21-24, Detroit September 13-16, New York September 13-16, Atlanta October 11-14, Miami Beach October 11-14, Philadelphia November 8-11, Chicago November 8-11, Denver November 29-December 2, Los Angeles November 29-December 2, Washington D.C. December 2-9. Sponsor: The Interface Group. This nationwide show is conducted for computer industry retailers and dealers. Fee: $7.50 general admission. Contact: The Interface Group, 300 First Ave., Needham, MA 02194.

SOFTEACH

April 8-9 Chicago, April 15-16 Atlanta. Sponsor: Softsel Computer Products. Forty-three major publishers of software will conduct individual seminars on the most effective means of selling their individual product. Fee: Free. Contact: Softsel Computer Products, 546 N. Oak St., Inglewood, CA 90302.

SPRING COMDEX '84

May 22-25. Georgia World Congress Mart, Apparel Mart, Manufacturers Mart, Atlanta. Sponsor: The Interface Group. Fee: $195. Contact: The Interface Group, 300 First Ave., Needham, MA 02194.

How To Put The Boss In

touch

With Lotus 1-2-3™

With ***Boss***/1-2-3, you can merge up-to-the-minute financial reports from The Boss Financial Accounting System into 1-2-3's spreadsheets and graphics. It's "touch-screen simple" with your HP 150.

You can compare your budget to your actual sales and expenditures, then graph the results for presentation. Or prepare a special report in exactly the format you need. You choose the information you want and the way you want to use it. The possibilities are endless.

And because The Boss works in **real time,** every bit of information you get is as current as the last transaction you entered.

You can also get in touch with your payroll, inventory, and time billing with the full line of The Boss Business Software Products.

Put the Boss in touch with 1-2-3. **Ask your HP dealer** for a demonstration of ***Boss***/1-2-3, or any of The Boss software products. Or call us toll free at **1-800-531-5483** for the name of the dealer nearest you. (In Texas, call 1-800-252-8184.)

***The Boss* Business Software Products.**

Balcones

Balcones Computer Corporation

1-2-3 and Lotus are trademarks of Lotus Development Corporation

Series 40—When and What

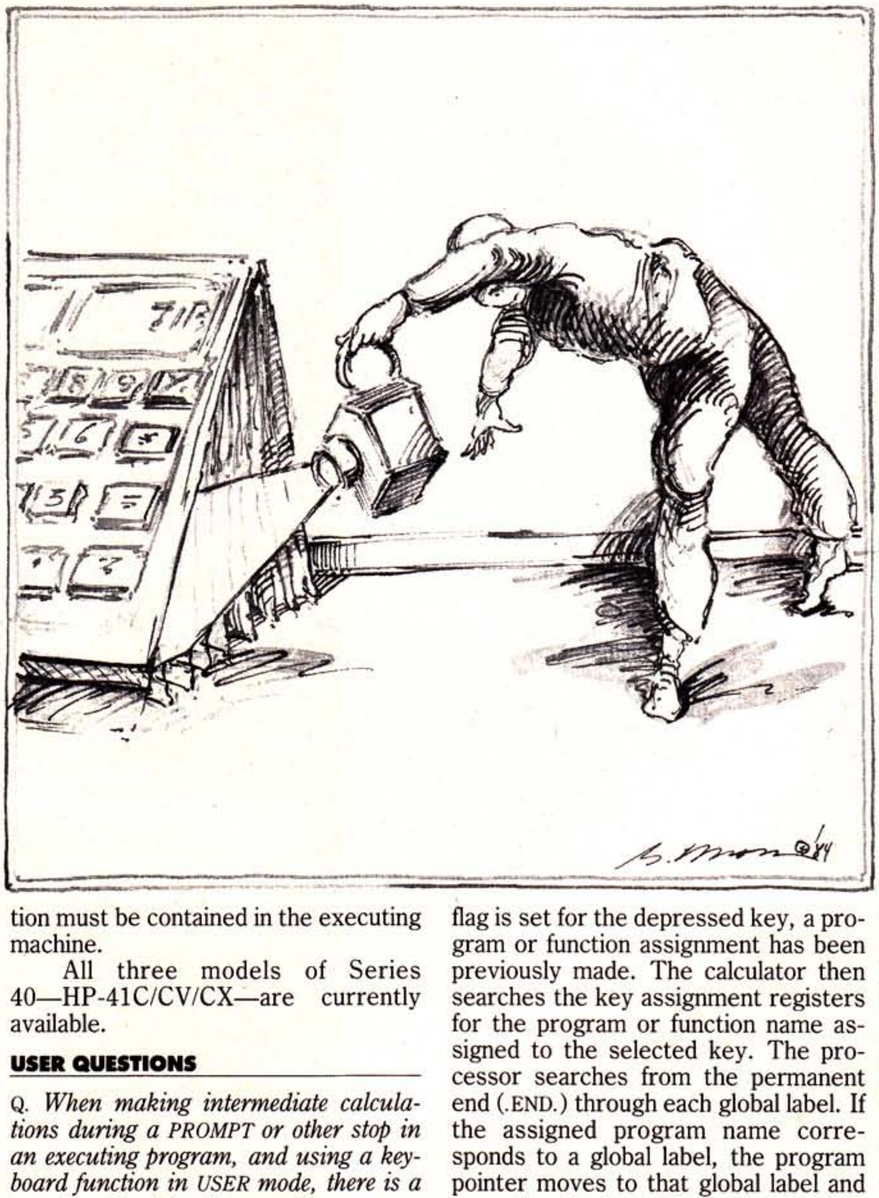
BY MARTIN HANSON

Many users have wondered about the history behind the Series 40. It can be traced back to the introduction of the HP-41C on July 16, 1979. The HP-41C was promoted as the first alphanumeric, fully programmable, continuous memory, handheld calculator. The first HP-41 contained many first-time features such as liquid-crystal display and redefinable keyboard. The HP-41C has 441 bytes of program memory or 63 data registers in the main memory configuration. The major peripherals available at introduction were the HP 82143 thermal printer and HP 82104 magnetic card reader. The HP 82153 optical wand for reading bar coded programs and data became available on July 1, 1980.

An expanded version of the HP-41C appeared at a trade show in Las Vegas on Jan. 7, 1981. The "HP-41CV Alphanumeric Full-Performance Programmable Calculator With Maximum Continuous Memory" is equivalent to the basic HP-41C with four memory modules or one quad memory module. The main memory configuration of the HP-41CV is 2,233 bytes of program memory or 319 data registers.

The HP interface loop module, introduced on December 21, 1981, allowed up to 30 HP-IL compatible devices to be connected in series and controlled by the HP-41. The first HP-IL peripherals to be released were the HP 82161 digital cassette drive, HP 82162 thermal printer, and the HP 3468 digital multimeter. The list of new HP-IL devices has grown to include video displays, 80-column impact printers, modems, and graphics plotters.

A new, revised HP-41, the HP-41CX, was announced on Nov. 1, 1983. The device is similar to an HP-41CV with a time module and extended functions/memory module, although there are differences. The HP-41CX has several new functions, redesigned catalogs, new alarm functions, and it comes with a completely rewritten users manual. The main memory configuration of the HP-41CX is the same as the HP-41CV. All programs developed for the HP-41C and HP-41CV will execute correctly on the new HP-41CX. The converse is not necessarily true. The compatibility question is similar to the HP-67/97 and HP-41 compatibility requirements; that is, the called function must be contained in the executing machine.



All three models of Series 40—HP-41C/CV/CX—are currently available.

USER QUESTIONS

Q. *When making intermediate calculations during a PROMPT or other stop in an executing program, and using a keyboard function in USER mode, there is a considerable delay in execution as compared with executing the same function in NORMAL mode.*

A. The delay or pause is actually the time required for the operating system to perform a search sequence. The pause will tend to vary with the number of programs, number of global labels, and number of local labels currently in memory. When a key is depressed while the HP-41 is in USER mode, the calculator first checks the system key assignment flags. The status of these flags can be checked or viewed using synthetic techniques.

When the system key assignment flag is set for the depressed key, a program or function assignment has been previously made. The calculator then searches the key assignment registers for the program or function name assigned to the selected key. The processor searches from the permanent end (.END.) through each global label. If the assigned program name corresponds to a global label, the program pointer moves to that global label and execution begins. If a corresponding global label is not found, the assignment is a CATALOG 3 function, which is performed on the current stack contents. It should be mentioned that the global label search includes application ROMs that are installed.

When the system key assignment flag is clear for the depressed key, the calculator must still perform a search if the selected key is in the top two rows or a shifted top row key. These keys act as an XEQ "local alpha label" corresponding to their respective local label designations. The processor searches downward from the current program pointer position for a corresponding local alpha label. The search wraps around at the program END to the top of the program and continues down to the point where the search began. If a corresponding local alpha label is found, the program pointer moves to that label and execution begins. If a corresponding local alpha label is not found, the calculator executes the NORMAL mode function assigned to the selected key.

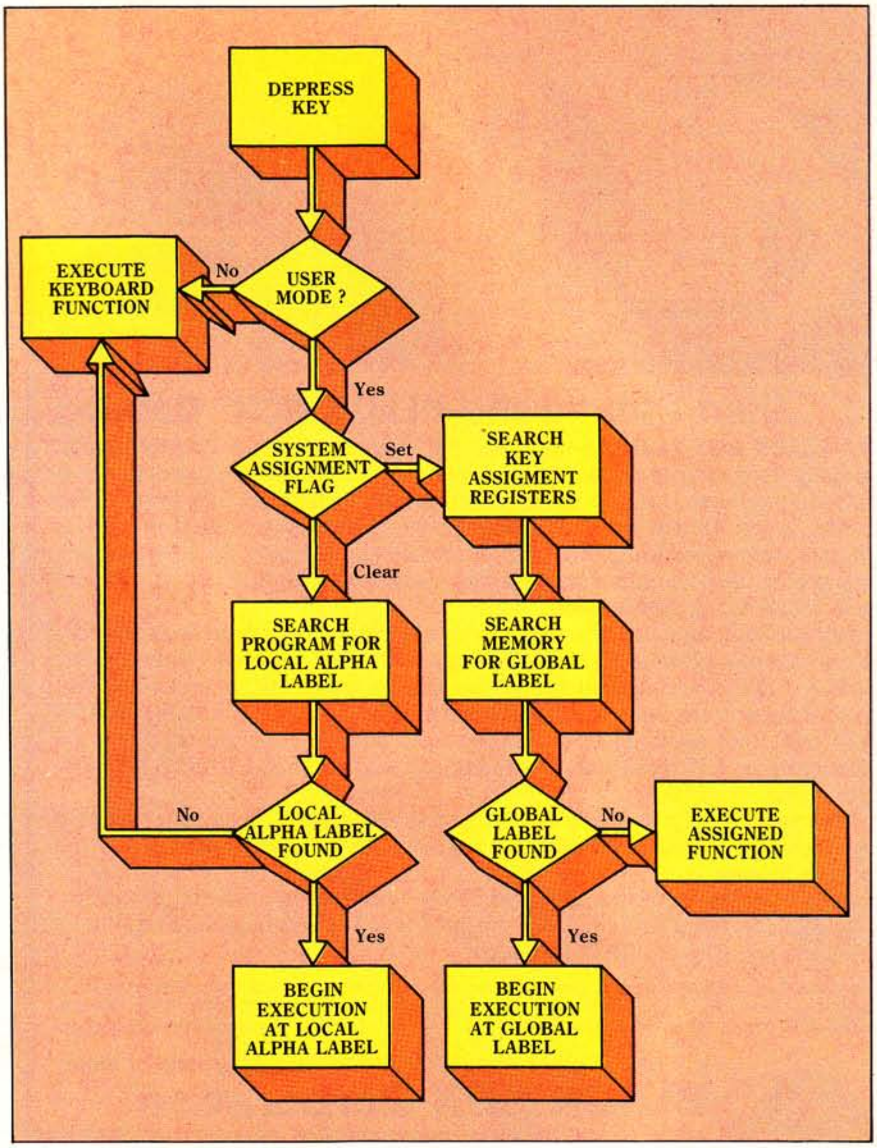
This process is illustrated in the accompanying flow chart. To avoid the searching delay and maintain the program pointer position, switch to NORMAL mode to perform any intermediate calculations not requiring the key assignments of USER mode.

Q. *Alpha registers M, N, O, and P can be used for additional "scratch" registers and for data if the Alpha register is not disturbed. I am having problems STOing and RCLing with register P.*

A. Your question exhibits one of the useful applications of synthetic programming. For those of you not familiar with synthetic program lines, they are program lines that cannot be keyed into the calculator using normal keyboard methods. Synthetics can be useful for flag control, key assignments, non-standard tones, graphics, and as in this case, for additional scratch registers. The problem with register P is that the processor uses part of register P for its own scratch purposes. This seriously impares the reliability of the register. In an executing program, if you can avoid the use of VIEW, AVIEW, and number entry lines, the contents of register P should be reliable.

Q. *I purchased the HP 82143 dedicated printer with my HP-41C several years ago. I would like to use the video interface for "soft-copy" output. Can the dedicated printer and the video interface be connected at the same time?*

A. No. Both the HP 82143 thermal printer and HP-IL module contain some of the same printer functions (XROM 29, ii). The small slide switch on the back of the HP-IL module must be set to the disable position when using the HP 82143 printer. The slide switch must be set to the enable position when using the video interface. The disable/enable refers to the printer functions in the HP-IL module. If you have the dedicated printer connected and HP-IL module installed and set to enable, you generally will put your HP-41 into a "lock-up" state. This is caused by the duplication in ROM addresses. The HP 82162 thermal printer can be used with the video interface in the IL loop. Output must be directed to the desired device using the device's address on the loop. This can be accomplished either manually or under program control.


DEPRESS KEY
USER MODE ?
No
EXECUTE KEYBOARD FUNCTION
Yes
SYSTEM ASSIGNMENT FLAG
Set
SEARCH KEY ASSIGMENT REGISTERS
Clear
SEARCH PROGRAM FOR LOCAL ALPHA LABEL
SEARCH MEMORY FOR GLOBAL LABEL
No
LOCAL ALPHA LABEL FOUND
GLOBAL LABEL FOUND
No
EXECUTE ASSIGNED FUNCTION
Yes
Yes
BEGIN EXECUTION AT LOCAL ALPHA LABEL
BEGIN EXECUTION AT GLOBAL LABEL

Q. *I have read the manual section on indirect addressing, but still have questions on indirect alpha addressing and its possible applications.*

A. Indirect addressing is an alternative method of specifying the argument of a function. It has many interesting and useful computational and branching applications. For example, if the alpha string START is currently stored in register 10, GTO IND 10 will cause the program pointer to move to the global label START and begin or continue execution at that point. If there is no global label START in program memory, NONEXISTENT will be displayed, the program pointer will not advance, and execution stops. Alpha branching can be used to move to desired programs in response to a prompt. Consider:

```
AON
"PROGRAM?"
PROMPT
AOFF
ASTO X
GTO IND X
```

This column is intended to be a users forum for exchange of information on Series 40 systems. We will feature new ideas, news items, interesting applications and answer several questions on Series 40 hardware/software in each issue. We invite your questions, comments, tips, suggestions, applications, and other ideas.

I thought that finding 25 miles of data cables, a dozen data switches (some with HPIB connectors), thirty line drivers, a Stat Mux that understood ENQ/ACK Flow control, and an ENQ/ACK ⟷ X-ON/X-OFF protocol converter for this computer would be a problem . . .

. . . then I found the BLACK BOX® Catalog

The **BLACK BOX® Catalog** has over 300* different hard to find products, ranging from simple cables to protocol converters, all designed to solve data communications problems. When we first installed this system, we turned to the **BLACK BOX® Catalog** for the cables, line drivers, and other devices we needed to connect our terminals and printers. As our company has grown, our computer system has grown, and **BLACK BOX** products have made the growth easier.

Not too long ago, our line charges for eight data lines from headquarters to our manufacturing subsidiary were going through the roof. I turned to my **BLACK BOX® Catalog** and found the Concentrator HP, a stat mux that could concentrate up to 8 data channels down to one. I phoned a **BLACK BOX** customer engineer and described my problem, he told me what the Concentrator HP would (and wouldn't) do and arranged a thirty-day trial evaluation.

We tried the units and they worked great! We now have one data line from headquarters to manufacturing, but we still run eight data channels — for a lot less money.

It seems that no matter what problems I run into in operating or expanding this computer system, from the largest to the smallest, I find the solution is in the **BLACK BOX® Catalog**.

* Data switches, data cables, tools, installation hardware, test sets, surge protectors, modems, modem eliminators, line drivers, protocol converters, interface converters, printer interfaces, print spoolers, multiplexors, current loop interfaces, reference books.

For a free copy of the BLACK BOX® Catalog, phone or write:

®
BLACK BOX Corporation
A MICOM COMPANY
Box 12800 • Pittsburgh, PA 15241
(412) 746-5500 • TWX 510-697-3125

PAGEFILE

PAGEFILE is an HP Basic program emulating a typewriter which can store, retrieve and revise pages. Erasures, deletions and revisions are painless. Pages may be printed with or without your customized letterhead. *PAGEFILE* can be learned within an hour or two with the step-by-step exercises in the 33-page instructions. All 66 lines of a page are available by simply scrolling the screen. What you see is exactly what you typed in your own format, and exactly how it will look when printed! Pages are stored or retrieved in seconds! The program is NOT secured and you can make copies for your own individual use. Each disc holds 43 page files. $75.00 for program disc and instructions. $15.00 for instructions alone. Works on HP-86 or HP-87 computers, requires 30K RAM memory and the AP ROM.

Order from:
Milton Beychok
63 Oak Tree Lane, Irvine, CA 92715
or phone (714) 786-0837

IN

THE

JUNE/JULY

ISSUE

OF

PROFESSIONAL
COMPUTING

A review of Nomad—HP's bold entry into the portable computer market

---

A step-by-step "how-to" guide for creating forms for the Series 80

Data Highwaymen, Part II: In this issue we identified the crimes; in our second, we offer preventions.

'Yellow pages' help rid ROM of bugs

BY DON PERSON

If you've been holding your breath waiting for an issue of the PCD newsletter, I advise you to exhale. The Personal Computer division in Corvallis no longer provides the Basic Exchange information letter. The explanation offered is the loss of Curtis Adams, who was a skillful project manager. He has since set up a software company of his own and is marketing modem communications software for the Series 80.

Apparently, it was an opportune moment. Because it was a period of hiring austerity, management made the decision to temporarily discontinue the service. It hasn't been revived.

Curt Adams won't need much luck. His software is doing well with more products promised. Rumor has it that he was involved in making the Professional Communications package. HP owns it now. . . . Meanwhile, purchasers of the 86/7 Advanced Programming ROM can expect an improving situation. In response to complaints, HP started adding "yellow sheets" to shipments of the item starting late last fall. The company became aware that there were many bugs mixed with the working code in the product. On receipt of the identifying top labels, replacements were to be sent in January. There were many bugs, and I was happy to send mine back. The latest twist is that the fix is promised about now.

The only new keywords that turned out to be reliable were those with functions based more or less on proven code borrowed from UTIL/1 and other existing binary programs. . . . If you are a fan of the Sony 3.5-inch micro disk, here's good news. The HP 110 will be the first product to use the double-sided drive. An HP-IL battery-powered version is coming. The Greeley, CO division is busy trying to get a package together that uses the new Sony double-sided transport. Sony makes the single-sided units that HP now ships. The double-sided version will be able to store twice the data on each of the little shirt pocket items, and will probably be introduced during the summer.

The biggest un-answered question is whether existing single-sided disks will "play." The smaller disks seem to be catching on. Now the cost of individual diskettes needs to drop a little.

The days of the 8-inch drive may be numbered. If you are an 86/7 owner, you probably didn't miss the advertising blitz that accompanied the release of the Personal Productivity Pack (Word/80, File/80 and Visicalc +). Unfortunately, even though shipments had begun and the manuals were well prepared, the programs may not have been quite ready. True, all three programs worked, but there were problems.

Two of these programs have been substantially reworked, and the improvements are noticeable. You can now trade in your A versions of both Word/80 and File/80 for the B revision for a charge of $40 each. Moreover, if you can demonstrate your problem with specific program deficiencies, the exchange is free. In both cases, the B versions are better. There is one bug you might find in Visicalc +.

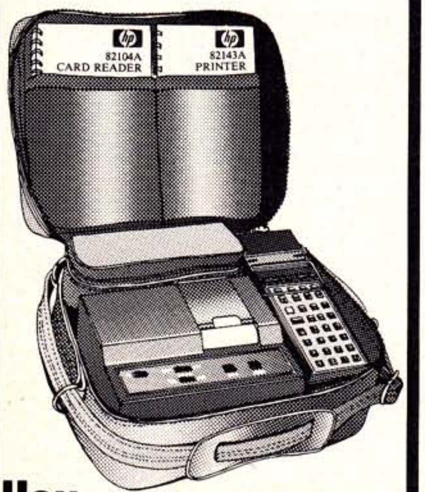
A complete crash may result if you try to store a formatted worksheet that contains un-initialized cells. When trying to read the disk, the worksheet may contain gobbledygook, or you may crash again. A way to protect yourself is to pre-load the sheet with initial values. Among other things, File/80-A had some problems with the binary Stevie, which controls the key management side of the data base. The B versions require a minimum of 128K RAM, whereas the originals used only 96K. File/80B has major improvements in query capability, printer control and duplicate key handling. It also now supports E-DISK. The Word/80B release has been widely accepted by 86/7 owners. The speed improvements in Word/80B, though not spectacular, definitely make it worth using.

Word/80B has a new bug for single disk users. If you mistakenly change disks with an open file, a GET can trap you in a loop. The program prompts that it is looking for the entry, but the only soft key available is

If you use an

HEWLETT PACKARD

HP-41CX or 41-CV Calculators With Card Reader and Printer/Plotter



You need The New RPN-41 Work Station

$109.95 COMPLETE

The new system package that provides instant conversion to one-piece desk top utility by custom-mounting the HP-41CX or CV calculator, card reader, and the printer on integrated sophisticated metal platforms that eliminate loose wires and secure your system with a security cable and lock.

All your HP-41CX or CV system components and accessories can be stored, consolidated, secured and used in the deluxe portable case which is also provided as part of the RPN-41 Work Station.

GOVERNMENT MARKETING SERVICES
GMS
701 EAST GUDE DRIVE
ROCKVILLE, MARYLAND 20850
Phone 301/340-3010

MasterCard, VISA, AMEX. orders accepted.

Name ____________________

Address ____________________

City ____________ State ________

Phone ____________ Zip ________

CONTINUE. There is no exit, short of RESET. Escape then causes a text loss and file disruption. And this is supposed to be non-technical software.

If you hope to modify Word/80 to do special tricks, forget it. It is just about uneditable because of the way it is stored on disk. Even after being unsecured, it contains calls to a ROM that can't be had. Hence you can't edit it. In addition, it makes use of a technique that can, under the right circumstances, minimize the wait while the program unfolds.

Without being too technical, I'll explain. Part of the time that a program needs when running is devoted to reserving blocks of memory for variable storage. Until this is done, the program is unable to store or recover individual pieces of information. In the 86/7, the process, known as allocation, is performed as individual variables are first encountered during runtime.

Unless an effort is made to have this occur to all the variables before they are needed, the user may be aware of the process as little hesitations when a new feature is called during use. Of course, the time to reserve this storage space can be perceived as an annoyance if one must wait for it to happen each time the program runs. The fellows in the lab decided there might be a way to make the program appear that it is running faster after loading. This is called stored allocation.

POINT OF DIMINISHING RETURNS

A binary program is responsible for a special form of program storage that not only writes the program to disk, but does so without first de-allocating it. The table of variables and variable contents are then stored on disk, too. This results in a much bigger disk file, but one that executes almost immediately when loaded. Unfortunately, there is a point of diminishing return.

If you use a hard disk or electronic memory to store the two main Word/80 programs, this process is useful. It is only somewhat helpful, however, if you use a 5.25-inch disk. Why? The speed at which the larger file is read back into the computer seems actually to be slower than the speed at which the computer can allocate a group of variables. The program comes with some of the stored variables initialized to values that can't be reloaded in the field. . . . If you deal directly with HP sales offices, there are sometimes some good deals on demonstrator Series 80 components. Look for 86As in the $700 range packaged with equally attractive pricing on monitors and 9130A (discontinued) drives. I've heard of prices as low as $350 for the drives. This price is much better than recent list, but not an exceptional bargain considering its OEM price of under $200. Caution to buyers: Beware of items that say things like HP-IB compatible or IEEE-488 interface. This is no assurance that the item will work with the Series 80. This is true of disk drives like the Commodore hard disk and others as well.

BARGAIN PRICED BOARD

I am happy to report that for all purposes but graphics dumps, the Epson line of printers, when equipped with the bargain priced IEEE board, seem to work fine with the 85, 86 and 87. The RX-80 model, purchased through mail order with the IEEE option, can be had for under $350—a very good deal. On another mail order matter, did anyone notice the demise of mail order discounters who handle HP 80s?

Last year, HP apparently decided that too many dealers were offering deals on the machines. Other than a return to higher prices, the only thing I noticed was that the sole local retail dealer went from one series 80 computer on display to none. The official explanation was that dealer service support caused the disenfranchisement, but some dealers tell it a little differently. Prices went back up, and then along came the 85 and 86 B machines. The situation after this move may have been taken as proof in the front office that what the personal computer market really wanted was a more popular operating system. Maybe what the market wants is better pricing, not another interpreted language.

In the future, this column will present the latest series 80 news on new models, peripherals, software and accessories. There'll be commentary, opinion and surprises. For instance, did you know that the Corvallis division has introduced a set of action games for the 80s?

More on that next month. Also, expect to see details about HP-compatible products not manufactured by the company. In months to come you'll be hearing about the "Winchester option." You'll find out about the growing number of specialized communications packages and assorted plug-ins, like the speech synthesizer. Watch for an in-depth look at the p-system language options for the 86/7.

A 'wrong' way to pick a microcomputer

BY SAM LIGHTMAN

I had been in the market for a professional-quality word processor for over five years, waiting for the good ones to come down in price or the bad ones to improve in quality.

At the same time, my wife, an art historian, needed something to manage her files and integrate them into her articles and papers.

In October, we decided the moment of truth was at hand and it was time to make a decision. Reluctantly, I chose the IBM PC.

So there we were at a small, tacky microcomputer show in the cavernous Civic Center in Philadelphia, looking for IBM dealers to discuss the purchase with. All kinds of weird and wonderful rigs were on display, from the fuzzy Epson to the cliff-hanging Wang, but no IBMs.

And then, down at the end of the hall, attracting an enthusiastic crowd, was a micro we'd never seen or heard of before—the HP 150.

We watched fascinated while the salesman put it through its paces. Touch graphics, touch spreadsheet, touch Rolodex, touch cursor.

Integrated software? You mean we can exchange information between files created with different programs?

The 3.5-inch microfloppies were also great. Protected diskettes—why hadn't anybody thought of that before? And they helped keep the overall size of the unit to a compact, appealing 12.1 square inches.

The placement of the thermal printer behind the monitor was inspired, elegant design. For the first time we thought about how nice it would be to have drafts at 120 cps to check before printing out our letter-quality finished copies.

And the monitor—nowhere had we seen a monitor with resolution to compare with this one. With its remarkable clarity, it threw all the other displays into downtown Eyestrain City.

"Maureen, put that literature down, we are not researching yet another computer," I said. "Besides, it's too expensive." It appeared to be nearly $1,000 higher than the IBM. But it was too late. We were hooked.

A month later, we gave up the struggle and descended on our friendly neighborhood HP dealer, checkbook in hand. When the dust cleared, we were back home surrounded by seven boxes of goodies, including the computer, the built-in thermal printer and a year's supply of paper, a Brother HR-15 letter-quality printer, WordStar, Personal Card File and a box of diskettes.

When we added it all up, we realized just how well we'd done. With the HP's 256K of RAM, touch screen, built-in clock and calendar, integrated software, and the deal we had made on the peripherals, we had purchased a far better system than we could have had for the same money with an IBM.

Of course, we did it all wrong. All the experts tell you to pick out your software first and then choose your computer. But we were beguiled by the computer, and settled for the software it ran in spite of some unwarranted misgivings.

Now, three months later, we are even more enthusiastic about the machine than when we bought it. We are still discovering its remarkable virtues, with occasional help from HPCoach. (HP's telephone support is nonpareil).

The machine itself is incredibly responsive. The integrated software has lived up to its promise: Maureen can move her PCFiles over to her WordStar documents at the flip of a disk.

And, except for the keyboard, the quality has not let us down. (I find the keyboard mechanically unacceptable and I'll be discussing that topic in a future issue.)

But what about the obvious problems, like software availability? Software has not been forthcoming at anything like the expected pace. Software proliferation is a function of market size. Will the market for 150 software actually materialize?

And what about HP's near-total control of software retailing? Nice for HP, not so good for anyone looking for an active market replete with mail-order discounts. DEC made a similar mistake with the Rainbow.

And how will I transmit data to the client with some other micro? Will anyone bother to create that program for such a dubious market? Will I be able to afford it if they do?

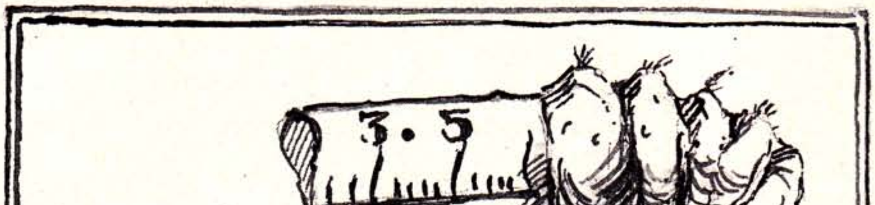
And—the biggest question of all—without IBM compatibility or Macintosh price, can the 150 even survive in a marketplace becoming daily more manic?

Why the 3.5-inch microfloppy for personal computers?

BY CYRIL YANSOUNI

Personal computer users are demanding more and more from their machines. After listening to what personal computer users want in a product HP has responded with what it feels will make personal computing significantly easier for first-time users and sophisticates alike. To do this, HP developed a number of innovations, including the HP 150's touchscreen, programmable soft keys, "adjustable tilt-and-swivel" terminal, a smaller desktop footprint, and pocket-size medium.

While the advantages of the touchscreen are well-documented, the benefits of the 3.5-inch microfloppy haven't received a lot of attention. In fact, some observers have criticized HP for deviating from the 5.25-inch "standard". But the change wasn't made without careful thought.



MAXIMUM UTILITY

Many considerations went into the development of the HP 150. The most important consideration was to combine maximum utility with the simplest possible user interface; hence, the touchscreen. Beyond that, the company felt that to make the HP 150 truly personal, its storage medium had to be easily transportable in a shirt pocket or purse—and not occupy an inordinate amount of desk space. HP also decided that the new medium had to offer increased capacity and a higher level of performance and reliability than our own comparable 5.25-inch product. Further, HP insisted that the new medium have the technological capability of keeping its personal computer products on a steadily improving price/performance curve for at least five years. Sony's 3.5-inch microfloppy disk drive accomplished all these goals.

From HP's perspective, the most important issue is reliability, because few things frustrate a user more than losing data stored on a disk. That's why the company believes the plastic-enclosed 3.5-inch Sony disk is a key feature of the HP 150.

By enclosing the disk in a hard polymer case with an automatic metal shutter, dirt, fingerprints and all the other contaminants that contribute to data loss are permanently locked out. The polymer jacket also gives users the freedom to write directly on the disk's label without damaging the medium. In addition, a write-protect tab guards against accidental erasure.

Before HP installed Sony's 3.5-inch drive on the HP 150, it "torture tested" it for a year and came up with some interesting results: the product proved to be four times more reliable than our previous 5.25-inch product, and the drive mechanism demonstrated a one percent annual warranty failure rate. That translates into ownership costs that are 33 to 50 percent lower than those of our comparable 5.25-inch drive.

The Sony product also allowed HP to set new standards in storage capacity. Single-sided and double density, the 3.5-inch disk has a formatted capacity of 270K bytes in a single drive machine or 540K bytes in a dual-drive configuration—the equivalent of a 35-track, double-sided, double-density 5.25-inch disk. It is also twice as dense and twice as fast as typical 5.25-inch products, including HP's. In the near future, we will introduce a double-sided 3.5-inch disk with more than 600K bytes of formatted capacity. In the future, 4 to 6 Mbytes will be packed onto a 3.5-inch disk using vertical recording techniques.

REDUCTION OF PRICES

Because of the 3.5-inch product's superior price/performance characteristics and overall reliability, HP adopted it as a standard for its personal and desktop computers, and has since pushed hard to have it adopted as the microfloppy industry standard. In doing so, the company assumed the risks inherent in promoting a new technology—namely that customers might reject the product and that another standard might emerge.

Those dangers have not materialized. Customer reponse has been overwhelmingly positive. Since HP introduced the 3.5-inch disk in late 1982, it has shipped more than 125,000 units—volumes that have allowed us to renegotiate our contract with Sony and reduce prices by 30 percent just one year after introduction.

Equally encouraging is that Apple Computer Inc. has also adopted Sony's 3.5-inch product for its Macintosh and Lisa 2 personal computers.

This had led many observers, such as Jim Porter, publisher of Disk/Trend Report, to conclude that "the battle [for a sub-5.25-inch microfloppy disk size standard in the U.S. market] is over," and that the 3.5-inch format is destined to emerge as the industry standard.

STANDARDS IN PROCESS

Meanwhile, The American National Standards Institute (ANSI) is voting on proposed technical specifications for the 3.5-inch disk drive. Upon their acceptance, which is expected by midyear, the 3.5-inch disk will become the first microfloppy product for which there are agreed upon physical standards.

This is important. The standardization of disk drive sizes is the first step toward overall data compatibility. Admittedly, this is a formidable goal because of the protocol differences among manufacturers, but it is nevertheless one that the industry must undertake. Standardization paves the way for mass production of compatible parts and holds the potential for eliminating or greatly reducing the time software publishers spend rewriting programs to run on dissimilar machines. Moreover, compatibility greatly reduces the cost of high technology goods.

Just as "user friendliness" became a dominant issue during the late 70s and early 80s, HP believes compatibility will become one of the key challenges for computer makers for the rest of this decade. Why? Consumers are demanding it. They want hosts, personal computers, storage media and networks that can "talk" to one another regardless of vendor.

By promoting the 3.5-inch disk as a standard, HP believes it can help reduce the cost of microcomputers, improve their utility and reliability and, ultimately, lead the industry toward a universal mass-storage format that will someday facilitate the universal exchange of data among computers from different vendors.

Cyril Yansouni is general manager of HP's Personal Computer Group.

TAJ™ The Accounts Journal™

Completely Integrated Business Software

TAJ Accounting Pac
- General Ledger, Accounts Receivable, Accounts Payable, and Payroll
- Completely Integrated On One Disc

TAJ Job Costing Pac
- Tracks Labor Time, Costs, and Revenues For Individual Jobs
- Integrates With TAJ Accounting or Operates As An Independent System

TAJ Forms Pac
- Generates Monthly Statements, Accounts Payable Checks, Payroll Checks, and W-2 Forms
- Provides a Professional Image For Your Company

TAJ Financial Graphics Pac
- Generates Bar Charts, Line Charts, and Pie Charts From the TAJ Accounting Pac
- Visually Presents Your Company's Position and Progress

Call For Free Brochure And Sample Reports
(916) 484-0155

Production Data Systems
2386 Fair Oaks Boulevard
Sacramento, CA 95825

OASYS/250

Office Automation Software for your HP/250

PLAN/250
- spreadsheet

WP/250
- word processing

RP/250
- report generation

BEAR Software Systems
3635 Dewey Avenue
Rochester, NY 14616

(716)663-3120

ENGINEERS

Fantastic first time offer for your HP-85
4 Powerful programs in one !
- BEAM ANALYSIS
- CONTINUOUS SPAN
- COLUMN DESIGN
- AREA MOMENT OF INERTIA

Cut your calculation time dramatically. Make your work enjoyable , accurate and productive with graphics, plotting and concise output with this extremely easy to use software.

$125

Available for HP 86,87

P.E.A.S.
7208 GRAND AVE.
PGH. PA. 15225
(412)264-3553

Communicating Software in the public domain

BY BILL CROW

As most long-time personal computer users know, there is a world of software in the public domain, available to anyone who can secure a copy. Public domain software ranges from crude, incomplete programs with non-existent documentation, to comprehensive, well-written applications that rival commercial programs costing hundreds of dollars. Searching for public domain software is a bit like shopping at a flea market—you must usually sift through a lot of unwanted junk before you find what you want.

This column will help you find the gems and point you in the right direction to access many other programs, enhancing the productivity and enjoyment of your HP personal computer at little or no cost. Before discussing actual software, however, it is a good idea to examine distribution channels.

There are many methods used for distributing public domain software; depending on your needs and your computer, one or more may be best for you. Downloading programs from another computer over the telephone via modem is both timely and cost effective.

On your end, you'll need a modem to interface your computer with the telephone line and a communications program capable of capturing the received information and saving it in a file. For low-volume usage, a 300-bit/s modem allows you to transmit and receive information at 30 characters per second. Depending on features you select, a 300-bit/s modem can cost between $100 and $250.

Different types of modems provide an acoustical interface with a telephone handset or a direct connection with the telephone line. Direct connection modems offer better features and performance, but acoustic couplers provide a broader flexibility to interface with a variety of telephones.

For higher performance, a 1.2-kbit/s modem can quadruple your communications speed, vastly improving information throughout. While even faster speeds are possible, 1.2 kbit/s is the practical limit when using a standard telephone line. Most 1.2-kbit/s modems offer a variety of "intelligent" features, and prices range between $500 and $900.

There are several 1.2-kbit/s communications protocols used, and none are compatible with each other. The Bell 212A protocol is the most common, followed by the Vadic 3400 protocol. The latter is supported only by Vadic (or vendors who have purchased the internal modem components from Vadic), but there are modems that automatically detect and use either the Vadic or Bell protocol. As an extra benefit, most Bell 212A-compatible modems can also operate at 300 bit/s. If you're considering a modem for 1.2-kbit/s operation, you should probably choose one that supports the Bell 212A protocol.

There are several limitations with higher-speed modems, however. Data transmission has less immunity to communications interference, so transmission errors may occur more frequently. Because of the higher equipment costs, many on-line machines (especially those maintained by volunteers) don't support 1.2-kbit/s communications. Finally, almost all 1.2-kbit/s modems are for direct connection to the telephone line; the frequencies used with the 212A protocol make acoustic coupling impossible, and while acoustic couplers do exist for the Vadic 3400 protocol, they are expensive and create a greater risk of transmission errors from telephone line interference.

In any communications link, one participant originates the connection and the other answers to complete the link. In the same fashion, modems operate in either ORIGINATE or ANSWER mode, depending on the role they play in initiating the communications session. Some older or inexpensive modems are capable of operating in only one mode—typically the ORIGINATE mode. This is adequate if you only plan to use your computer to call other systems, but it prevents you from receiving calls from others. For the minimal price differences with today's modems, it's advisable to select a modem that can both ORIGINATE and ANSWER calls; this provides the best flexibility to meet your future needs.

Thanks to the advances in microprocessor technology, many of today's modems provide sophisticated intelligent features. Autodial capability is the most common and most desirable option available, allowing the modem to automatically dial the telephone number of the target device. Detecting an incoming call, choosing either pulse or tone dialing, setting the time to wait for a call to be answered, or selecting the number of rings before an incoming call is answered are typical features found in intelligent modems.

WHY A PROGRAM?

Since an HP Series 100 computer is capable of operating as a terminal without any additional software, many question why a communications program is required at all. If emulating a terminal is the only objective, the built-in capability of the HP 150 or HP 120/125 would be adequate, but to provide access to software on remote computers, other capabilities are also required. Let's look at a summary of the features provided by a communications program. Not every communications program offers all these capabilities, and there are many different ways in which they can be implemented.

- **Asynchronous Communications.** This is the fundamental capability of emulating the operation of a simple terminal. While many personal computers require a communcations program to perform this task, this capability is built in to all HP Series 100 personal computers.
- **Terminal Emulation.** This refers to the ability of the personal computer to emulate the functions of a particular type of terminal. This typically includes the ability to position the cursor, clear the screen, enable display enhancements such as inverse video characters or underlining, or generate graphics. The 150 is capable of emulating an HP 2623A graphics terminal, and the HP 120/125 emulates the capabilities of an HP 2621B data terminal. While these features are built in to the computer, it could be possible to emulate other industry-standard terminals with the appropriate communications program.
- **Data Capture.** This feature allows a personal computer to "remember" the data transmitted or received by saving it in memory or in a disk file. Some communications programs can only capture as much information as can fit in memory at one time, requiring the operator to pause reception and transfer this information to disk before continuing. More sophisticated machines allow the captured information to be regularly transferred to a disk file, without manual intervention. This latter capability requires some form of "handshaking" between the two computers to control the flow of information. Without the appropriate handshaking, information would be lost while the system paused to access the disk.
- **Text Upload.** This feature allows the personal computer to send the contents of a file previously created as if it were information being typed at the keyboard. While this is a normal operation, handshaking is required to insure that the information transferred does not overflow the receiving computer. This typically involves some capability to pause at the end of each line sent to insure the remote system is prepared to receive the next line. Different techniques include waiting for a specified prompt character or pausing for a fixed period of time. A wide variety of capabilities is required because there are few standards among different computers.
- **Blocked File Transfers.** While data capture and text upload provide the basic capabilities needed to send and receive files, there are definite limitations. Telephone line interference during the transmission generates errors in the received file. Also, extraneous records appear at the beginning and end of the file, since the data capture operation cannot always be started and stopped at the exact beginning and end of a file. An editor or word processor must be used to remove this unwanted information.

With the appropriate communications program at each end of the link, information can be transferred in blocks, with a test performed to verify that each block was received correctly. Whenever an error is detected, the offending block is retransmitted, insuring that the complete file is transferred in tact. Since there is no single standard for the protocol used for blocked file transfers, a communications program to perform this task is typically designed for a specific operating environment.

- **Macro Command Files.** To facilitate automatic operation or translate multi-step sequences into a single function, some communications programs allow a sequence of commonly used steps which are saved in a file, then performed with a single command. With advanced features, such as the ability to check the system clock or in conjunction with an intelligent modem, entire communications operations can be set up to operate in an unattended mode.

For the Series 100 user, DSN/LINK, the communications program from HP, provides all of the features listed. DSN/LINK, combined with the configuration flexibility of the computer, offers a variety of handshaking options for data capture (called logging) and text upload. The blocked file transfer capability of DSN/LINK is currently supported on only the HP 3000 family of minicomputers, but HP provides all the necessary protocol documentation in the DSN/LINK manual for the enterprising programmer to write the required communications program on any other computer.

While DSN/LINK is the only option available today for the 150, there are several other good communications programs for the 120/125. One of the best values is MODEM7, a public domain program that provides all of the necessary capability to emulate a terminal, capture received information, transmit a file to the remote computer and even perform blocked file transfers with error checking. MODEM7 is included on Volume #1 of the 120/125 Contributed Software Library, available from INTEREX, the International Association of HP Computer Users.

Armed with this basic primer on personal computer data communications, you're ready to start exploring the vast world of electronic information. Once you're set up with modem and communications program, one of the first stops we recommend is the HP Forum. This is an on-line bulletin board and software exchange on the CompuServe network, maintained and operated by INTEREX. This electronic users group gives you access to the latest in public domain software, as well as a continual source of current tips, techniques, news and information. First, you'll need to become a subscriber to the CompuServe network; subscription kits are available through your local computer store. Once you've received your CompuServe account number and password, you have access to a wide range of services, including up-to-the-minute wire service news, national weather, stock listings and hundreds of other data bases.

In the next column, we'll take a look at public domain software available for the HP Series 100 and we'll explore the step-by-step procedures to download programs from the Forum on CompuServe to your personal computer. Because the success of public domain libraries depends on contributions, we'll also look at the procedures to submit your programs to our library. For users of the Series 40, 70, 80 or 200 PCs, we'll investigate your sources for public domain software as well.

Bill Crow is Executive Director of INTEREX.

Problem PAM slows down computer time

Users, have a problem with an HP personal computer? This "Users' Exchange" can be your economical problem-solver. Send your questions to Professional Computing Magazine, John Wiley & Sons, 605 Third Ave., New York, NY 10158. Please include your name and address with all questions, although these will be withheld if requested. Most questions will be answered by experts from Interex, the International Association of Hewlett-Packard Computer Users.

Q: *Every time I reenter the Personal Applications Manager (PAM) on my HP 150, or ask it to reread the disks, it takes three or four seconds to display the available applications. We have several 150s in our office, and others perform this task in much less time. Most of our systems have the HP 9121D micro-floppy disk drive and a couple have extended memory. We have one system with an HP 9133XV Winchester disk drive, and it takes as much as 30 seconds to display the applications when running PAM. Is this normal? Why do some of our systems operate faster than others?*

A: Your problem is caused by a device configuration error with the disk drives and can be easily remedied. Even though most 150s are sold with the HP 9121D micro-floppy disk drive, the default MS-DOS configuration is not correct for this setup. As a result, MS-DOS believes there is another disk drive available, and the delay you experience is the time the system spends unsuccessfully attempting to locate this non-existent device. To correct this problem, you need to run the program DEVCONFIG, found on your system master diskette. If your HP 150 is set up with its default configuration, you should find the following values listed for your disk drives:

	INTERFACE	ADDR	DRIVE
A:	HP-IB	0	0
B:	HP-IB	0	1
C:	HP-IB	2	0

If you have the HP 9121D disk drive, only drives A: and B: actually exist. The extra delay is caused by PAM attempting to find C:. Simply change C: to "No Device" and save the updated configuration.

For your system with the HP 9133XV Winchester disk drive and one micro-floppy disk drive, the configuration should be:

	INTERACE	ADDR	DRIVE
A:	HP-IB	0	0
B:	HP-IB	2	0

Of course, the HP-IB address switches on the disk drive must also be set to match this information. Refer to Appendix A of your 150 owner's guide for additional information on running DEVCONFIG and setting up your disk drives.

Q: *When I first turn my 150 on, I receive the following error message:*

Power-on test failed 1000
Press RETURN to clear

After I press RETURN, the system boots normally and everything appears to operate correctly. I can't find anything in the manual that says what the error is, and I'm concerned there is something wrong with my system. What's the cause of this error? Is it something I should worry about?

A: In this case, it's a fairly minor problem and usually easy to correct. When power is first applied to the 150, it performs an extensive set of self-diagnostics, checking out the processor and associated hardware. Power-on test failure 1000 indicates a problem was detected when testing the touch screen; one or more of the infared beams that forms the touch detection grid in front of the screen is being interrupted. The most common cause is debris that falls into the small holes along the bottom edge of the screen bezel. Take a dry cotton swab (don't use any solvent or other liquid), and carefully clean out each of the 21 holes. Also check that there are no other visible obstructions blocking the other holes around the screen perimeter. If this technique does not solve the problem, there may be a more serious problem with the touch screen. You should contact your dealer or the local HP office and arrange for service.

Q: *I've just started using my 150 with VisiCalc, and it seems to be doing some strange things to my disks. After I finished running VisiCalc, I checked my data disk with File Manager, and only*

my VisiCalc files were there. None of my other files, mostly MemoMaker files, were on the disc. Since some of those files were important documents for which I had no backups, I loaded MemoMaker to start typing those files back in. When I accessed File Manager through MemoMaker, all of my files were back again! I returned to PAM and checked the disk with File Manager a second time, and all of the files were indeed there. Since then, I've been able to repeat the same problem: after running VisiCalc, only my VisiCalc files are left on the disk, but after I run another program or turn the power off and back on, all of the "lost" files reappear. What gives? Why did those files go away?

A: You've been tripped up by a seldom-used feature of File Manager and by VisiCalc's attempts to make your work easier. Unfortunately, if you're not aware of what's happening, you can be easily lead to believe that your non-VisiCalc files are gone.

One of File Manager's options is the wildcard. This feature, documented on page 5-16 of the 150 owner's guide, allows you to restrict File Manager's display to a subset of the files on the disk. If you select LOAD SHEET or STORE SHEET and then access File Manager, VisiCalc automatically sets the wildcard to "*.VC", allowing only VisiCalc files to be displayed. Unfortunately, when you exit VisiCalc, the wildcard is not reset. That's why, after running VisiCalc, File Manager displays only files with an extension of VC. MemoMaker resets the wildcard to the default value of "*.*" (as does rebooting the system), therefore all files are once again displayed as soon as MemoMaker has been loaded. Your "lost" files were never gone, but the wildcard feature of File Manager prevented them from being displayed.

To prevent VisiCalc from setting the wildcard, you can access File Manager and select the desired file before you choose LOAD SHEET or STORE SHEET. Alternately, you can manually set the wildcard back to the default value of "*.*", as described in the owner's guide.

Q: *I have a Radio Shack TRS-80 Model 100 portable computer and I'd like to be able to transfer my documents between it and my 150.*

A: File transfer between different personal computers is almost always possible, but requires careful attention to each system's interfacing and handshaking requirements. Even given a successful file transfer, differences in file formats can impose limitations on the usefulness of the information once it has been transferred. In your specific case, its relatively easy to transfer documents between MemoMaker on the HP 150 and the built-in text editor of the TRS-80 Model 100. However, you'll also need a communications program for each system; it's built-in on the Model 100. HP's DSN/LINK will do the job on the 150.

First, you must connect the RS-232C serial ports of each device together. Use a three-wire modem eliminator cable, with the following pinout:

MODEL 100		HP 150
Pin 2	--------------	Pin 3
Pin 3	--------------	Pin 2
Pin 7	--------------	Pin 7

This connects the TRANSMIT DATA pin with the RECEIVE DATA pin for each device, as well as connecting the common data ground at pin 7. This is a fairly common cable and should be available from your local dealer.

Next, each system must be configured to a compatible configuration. This is done on the Model 100 using the Telecom program's STAT command. The command "STAT 87IIE" sets communications at 9.6 kbit/s with 7 data bits and 1 stop bit, ignoring parity and enabling the XON/XOFF handshaking. For the HP 150, set up Port 1 to communicate at 9.6 kbit/s, with 7 data bits and 1 stop bit. Set Parity to "0's" and set Check Parity to "No". Finally, both RecvPace and XmitPace should be set to Xon/Xoff and EnqAck should be set to "No". Instructions can be found in Appendix A of the Owner's Manual.

At this point, you're ready to attempt a transfer. Ready the 150 to receive a file by loading DSN/LINK and selecting a local log file. From the Model 100 Telecom program, select the UPLOAD function and give the name of the file to be transmitted. When prompted for the width, enter the inter-margin spacing you plan to use in MemoMaker. The Model 100 will automatically split the records at the appropriate word breaks when transmitting the file.

Don't be alarmed by the display on the 150; the Model 100 transmits a carriage return character only at the end of each record and doesn't send a line feed. As a result, each record transmitted will overwrite the previous record on the display screen. After the upload is completed, close the 150's log file and exit DSN/LINK. You should now be able to access the file from MemoMaker, with few formatting changes required.

CADD/86-87
2D COMPUTER AIDED DRAFTING

CADD/86-87 Functions:
Drawing, Editing, Plotting (A to E size), Windowing, Transformations (scale, rotate, move, replicate, delete), Auto-Dimensioning, Mass Storage, Digitizing, Searching, Symbols, Text, Circles, Arcs, Polygons, Scaling, Cursor Snapping, Angular Cursor Movement, and more.
CADD/87 provides an accurate, time-efficient, and cost-effective solution to a broad spectrum of design & drafting applications.

192K RAM MINIMUM
Price $700.00

For further information contact:
TENSEGRITY, Inc.
2424 Addison St.
Chicago, IL 60618
1-312-935-9714

TECHNICAL SOFTWARE

Hewlett Packard
Series 75, 80, 100, 200

- CAE/CAD/CAT
- EE, OR, MS, EDUC.
- Signal Processing
- Statistics
- Personal Instruments
- Tutorials
- Accessories
- Custom Development
- Affordable

SEND FOR
LITERATURE

Analytic Instruments
1543 Inlet Court
Reston, VA 22090
703-435-5753

AI An HP PLUS Software Supplier

ADVERTISERS INDEX

ADVERTISER	PAGE #
Ace Computer Center	64
Advanced Microsolutions	4
Analytic Instruments	87
Applied Software Technology, Inc.	10
Balcones Computer Corporation	69, 71, 73, 75
Bear Software Systems, Inc.	83
Milton Beychok	78
Black Box Corporation	78
Commercial Micro Systems, Inc.	Cover IV
Complete Computing, Inc.	64
Eventide Clockworks, Inc.	9
Government Marketing Services	80
Hewlett-Packard/Boise	15
Hewlett-Packard/Cupertino	62
Hewlett-Packard/San Diego	Cover II & 1
ISOREG	61
Kelly Company	Opposite 28
Leading Edge, Inc.	2
National Planning and Consulting Corporation	66
Omni	66
P.E.A.S.	83
Production Data Systems	83
Protracoa	74
Seitz Technical Products, Inc.	70
SoftHelp	72
Structured Software Systems	70
Tensegrity, Inc.	87
Western Graphtec	Cover III
Westminster Software	65, 67
John Wiley & Sons, Inc.	6, 16-17

WANT MORE HELP?

PROFESSIONAL COMPUTING SOURCE SERVICE

If you'd like further information regarding any product advertised in this issue of *Professional Computing,* tell us—we'll be pleased to forward your inquiry to the appropriate source.

NAME ____________________

ADDRESS ____________________

CITY ____________ STATE ____________ ZIP ____________

Mail to: Source Manager
Professional Computing
605 Third Avenue
New York, NY 10158

ADVERTISING SALES STAFF

ADVERTISING SALES DIRECTOR
Daniel S. Lipner

REGIONAL SALES REPRESENTATIVE
Jonathan C. Kummer

ADVERTISING/PRODUCTION ASSISTANT
Merle Beth Wise

NORTHEAST

Daniel S. Lipner
Advertising Sales Director
Professional Computing
605 Third Avenue
New York, NY 10158
(212) 725-2919

MID-ATLANTIC/SOUTHEAST

Bernard M. Gittelman
Sharon K. Brooks
Kathy Hicks
Joseph T. Porter
The Gittelman Company
Summit Office Center
7266 Summit Avenue
Forth Washington, PA 19034
(215) 646-5700

Kathy Hicks
Atlanta, GA (404) 523-1252

MIDWEST

Jonathan C. Kummer
Professional Computing
605 Third Avenue
New York, NY 10158
(212) 725-2919

SOUTHWEST

Frank E. LeBeau
James O. LeBeau
Howard N. Smith, Jr.
LeBeau Associates, Inc.
5934 Royal Lane, Suite 230
Dallas, TX 75230
(214) 987-4094

Robert H. Heidersbach
Denver, CO (303) 759-3015

Gene Holland
Houston, TX (713) 626-3069

WEST COAST

Ron Thorstenson
Roy Tunison
Western Media Sales
Executive Office Plaza
50 West Hillcrest Drive, Suite 215
Thousand Oaks, CA 91360
(805) 496-3500

SAVE SHOPPING TIME WITH OUR "BUNDLED" MP1000 LINE

Complete "Turnkey" System – Plotter, Software & Cable – Only $1190

Because we want to see you on line – not in line – Western Graphtec is now "bundling" the MP1000 plotter – and at a very minimal increase in cost. Your "package" includes plotter, application software, cable and interface. The entire cost is only $1190.00 – a savings of almost $600.00.

The MP1000 "bundle" includes the popular KeyChart™ software package which allows you to access most electronic spreadsheet data. The output is in graphs, bar charts, pie charts and diagrams. The system will operate on IBM, TI, Epson, Osborne, Kaypro and other upcoming operating systems.

Also, this lightweight, 6-pen plotter incorporates the HP-GL syntax so that you can use any application program configured for that protocol. This is in addition to our own powerful, built-in firmware.

Automatic selection of up to 6 distinctive color pens enables you to produce bold, brilliant hardcopy graphics. To support your varied requirements, you can select from oil or water base fiber tip, or ink drafting pens.

This complete turnkey system is available with a built-in RS232C, IEEE-488, or 8-bit parallel interface. You only need to tell us which you require. And we even include the connecting cable.

Don't wait – phone us your shopping list today! Call our Customer Service Department for the name of your nearest distributor.

™KeyChart is a registered trademark of SoftKey, inc.

Software ?
Interface ?
Connecting Cables ?
WESTERN GRAPHTEC
Turnkey System Contents:
1. 6-Pen Plotter
2. Business Graphics Software
3. Connecting Cable
4. Built-in Interface
$1190
SoftKey, Inc.
KeyChart

WESTERN GRAPHTEC

Recording your past . . . Plotting your future.

12 Chrysler Street, Irvine, California 92714
(714) 770-6010 • Outside Calif: (800) 854-8385

Up and Running on the

HP-150

STEP1™ BUSINESS SOFTWARE

A premium software product deserves a prestigious computer to run on. We are pleased to announce the availability of **STEP1** business software products on Hewlett Packard's new personal computer, the HP-150.

STEP1 represents a new plateau for business and accounting software products. Extremely functional and thorough in design, **STEP1** has met the requirements of the most discriminating users. Yet the documentation provided is straightforward and easy to follow, even if computers are new to you.

Included in the **STEP1** family are Inventory Control, Order Entry, Invoicing, Accounts Receivable, General Ledger, Accounts Payable, and Management Reports.

STEP1 is available for demonstration now at Hewlett Packard dealers everywhere. Stop in and see it, or call the numbers below for the dealer nearest you.

CMS COMMERCIAL MICRO-SYSTEMS, INC.

P.O. Box 2575 • Newbury Park, California, 91320

(800) 321-1103 In California: (818) 991-6030